Implementation of the Plate Meal Method towards Self-Management of Type 2 Diabetes Mellitus Patients

Rauza Alda, Riyan Mulfianda[*], Nanda Desreza
Fakultas Ilmu Kesehatan Universitas Abulyatama, Aceh, Indonesia
[*]*Correspondence: ryanmulfianda@abulyatama.ac.id*

Abstract

Plate meal is a diet therapy program for Diabetes Mellitus Type 2 patients, which may balance the blood glucose by dividing food on the plate. Improving patient self-management may difference the patients, especially those with Diabetes Mellitus type 2. This research aimed to determine the difference of the plate meal method with diet program implementation toward self-management among patients with Diabetes Mellitus type 2. This research was a quasi-experiment with pre and post-test equivalent control group methods. The population of this research was thirty patients with Diabetes Mellitus type 2 in Ulee Kareng Regional Technical Implementation Unit Health Community Center of Banda Aceh, which was divided into two groups, consisting of 15 respondents from the intervention group and 15 from the control group. The technique used in taking the samples was purposive sampling. This research was conducted in Ulee Kareng Regional Technical Implementation Unit Health Community Center from June 19 to 27, 2023. The data analysis used was a paired t-test and an independent t-test. The result of the research showed that the p-value of the paired t-test on the intervention group was 0.002. Therefore, there was a difference. The p-value of the control group was 0.369, which showed that there was no difference toward the control group, while the p-value of the independent t-test was 0.047 (p-Value < 0,05), indicating that there was an difference between the intervention and control group after the treatment of the intervention group. The conclusion of this study is that there is a difference in the application of the plate meal method diet program towards self-management in Type 2 DM patients at the UPTD Ulee Kareng Community Health Center, Banda Aceh between the control and treatment groups.

Keywords: Diabetes Mellitus Tipe 2, Plate Meal, Self Management

INTRODUCTION

Non-Communicable Diseases (NCDs) are a global issue as they contribute to a rise in mortality rates worldwide. Diabetes Mellitus (DM) is a prevalent and grave metabolic disorder. Diabetes mellitus, a persistent ailment, necessitates careful dietary management for effective treatment (1).

By 2023, it is projected that the global population of individuals affected by DM would reach around 41.8 million. The majority of cases occur in individuals between the ages of 20 and 59. Meanwhile, the International Diabetes Federation (IDF) predicts that the number of deaths caused by diabetes mellitus (DM) would rise to 643 million people by 2030 and further grow to 783 million people by 2045 (2).

Indonesia ranks seventh among the top 10 countries with the highest prevalence of DM, with a total of 179.71 million persons or 10.6% of the population affected. In the Aceh region, diabetes mellitus is the second most frequent non-communicable disease (NCD) after hypertension. The number of persons affected by diabetes is 184,527, while 97,131 people, which is 53% of the total, receive standard services. There has been a rise in the occurrence of DM in Aceh. According to the 2021 Aceh Health Service profile, the rate of diabetes mellitus (DM) in Aceh was 1.8% in 2013, but it climbed to 2.5% in 2018. The prevalence in Aceh Province exhibits a substantial disparity when compared to the national increase. It is imperative to reassess the issue of managing DM in Aceh province (3).

Diabetes mellitus is a chronic and lifelong condition that poses a significant threat as it can lead to mortality and give rise to severe complications, including macrovascular and microvascular damage

to the eyes, kidneys, nerves, and heart. These problems can result in higher death rates, reduced quality of life, and poorer compliance with therapy due to the prolonged duration of the condition. Complications can be minimized if people with diabetes mellitus possess adequate skills and knowledge to regulate their condition, namely through the adoption of self-management techniques (4).

Self-management plays a crucial role in assisting patients with diabetes mellitus in preserving their health and managing their high blood sugar levels (5).

In order to enhance self-management in the patient's dietary regimen for maintaining stable blood sugar levels, the plate meal method is implemented as an approach to the diet program. The plate meal technique is a dietary therapy approach designed to manage Type 2 DM by splitting food into plates, hence helping to regulate blood glucose levels. If patients with diabetes mellitus (DM) are able to utilize the plate meal technique, it will lead to the indirect fulfillment of self-management behavior in these patients. Self-management refers to the practice of autonomously monitoring and managing the demands of patients with diabetes mellitus (DM), including the management of their diet. This involves patients taking responsibility for effectively managing their dietary intake to address their specific medical state. The utilization of the plate meal technique facilitates the management of diet and eating patterns for individuals with diabetes mellitus, hence enhancing their ability to engage in self-management practices (6).

Prior research findings indicate that there is a distinct variation in the dietary self-management of individuals with DM. There is a notable disparity observed before and after the implementation of an intervention, with a p-value of 0.01 and a commendable success rate of 76.6%. Furthermore, there is a discernible contrast between the intervention group and the control group, with a p-value of 0.00 (5).

Self-management refers to the practice of independently controlling many aspects of patient care, including eating. The plate meal diet program is expected to play a role in enhancing the self-management of patients with Type 2 diabetes mellitus. The objective of this study is to identify the disparities in the implementation of the plate meal method diet program on self-management among patients with Type 2 Diabetes Mellitus.

The hypothesis for this research is as follows:

1. H1: The study found significant differences in the self-management of Type 2 DM patients at the UPTD Ulee Karenng Community Health Center, Banda Aceh City, before and after implementing a diet program utilizing the plate meal technique in the intervention group compared to the control group.

Ho: There is no discernible distinction in the self-management of Type 2 DM patients at the UPTD Ulee Karenng Community Health Center, Banda Aceh City, before and after adopting a diet program utilizing the plate meal technique in both the intervention group and the control group.

METHOD

This study is a quasi-experimental study with a pre and post test non-equivalent control group approach conducted at the UPTD Ulee Kareng Health Center, Banda Aceh City. The population in this study were Type 2 DM patients at the UPTD Ulee Kareng Health Center, Banda Aceh City aged 30-65 years in 2023. The sampling technique was purposive sampling according to the inclusion and exclusion criteria.

1. Inclusion criteria:
   - Willing to be a respondent
   - Patients who have been diagnosed with Type 2 DM
   - Patients are not taking medication
   - Patients aged 30-65 years
   - Patients are able to carry out independent activities
   - Patients are able to communicate well
   - Patients are able to read and write
   - Patients do not have hearing and

vision problems
- Patients who are in the working area of the UPTD Ulee Kareng Health Center, Banda Aceh City
2. Exclusion criteria:
    - Patients who are taking medication
    - Patients withdraw from the study
    - Patients who are not cooperative
    - Patients who are unable to read and write
    - Patients who have hearing and vision problems
    - Patients who are not in the working area of the UPTD Ulee Kareng Health Center, Banda Aceh City

A sample of 30 patients was divided into two groups, namely the intervention group of 15 patients by providing the plate meal method and also pocket book media related to diet program for seven days then given pretest on the first day and posttest on the last day and control group 15 patients researchers only asked respondents to find information and implement it then given pretest on the first day and posttest on the last day.

The instrument used in this study was The Self Management Dietary Behaviors Questionnaire (DSMBQ) Questionnaire used for self-management variables with 16 question items (8,9). All variables were analyzed using univariate analysis, then bivariate analysis paired sample t-test to see the difference in the relationship between the determining variables, and T-Independent test analysis was carried out to see the difference between the intervention group and the control group.

RESULTS

The intervention group consisted primarily of respondents in the late adult category, with 53.3% falling into this age range. The majority of respondents were female, accounting for 100.0% of the group. This group was chosen because they were deemed suitable for implementing the plate meal method directly. In terms of education, 86.7% of the respondents had

completed secondary education. The majority of respondents (93.3%) were unemployed. The duration of diabetes mellitus (DM) for most respondents (60.0%) was between 3-5 years. Blood sugar checks were conducted once a month for 86.7% of the respondents. It is worth noting that all respondents did not take medication or participate in any previous diet programs, as it was believed that these factors would not impact the plate meal diet pattern. In the control group, the majority of respondents were in the late adult category, accounting for 86.7% of the total. Additionally, all respondents in this group were female. Regarding education, 73.3% of the respondents had completed secondary education. Furthermore, the majority of respondents in the control group were unemployed, making up 86.7% of the total. In terms of the duration of DM (diabetes mellitus), 73.3% of the respondents had been living with the condition for 3-5 years. Lastly, 93.3% of the respondents in the control group reported checking their blood sugar levels only once a month. Table 1.

The univariate analysis revealed that the majority of participants in the intervention group exhibited a moderate level of self-management during the pretest, with 53.3% falling into this category. Additionally, 6.7% of participants demonstrated a high level of self-management during the pretest. Following the intervention, the posttest results showed that most respondents had a moderate level of self-management, with 60.0% falling into this category. Furthermore, 33.3% of respondents exhibited a high level of self-management. In the control group, the majority of respondents had a moderate level of self-management before the test, with 80.0% falling into this category. Additionally, 6.7% had a high level of self-management. After the test, the majority of respondents still had a moderate level of self-management, with 66.7% falling into this category. However, there was an increase in the number of respondents with a high level of self-management, which rose to

20.0%. These findings are summarized in Table 2.

The outcomes of the paired T-Test for the pretest and posttest in both the intervention group and control group. The intervention group, consisting of pretest and posttest, had a mean value of -7,750 and a standard deviation of 4.528. In the control group, the mean value for the pretest and posttest was -1.933, with a standard deviation of 8.066. The t-test conducted on the pretest and posttest data yielded a significant result, with a p-value of 0.002, which is less than the predetermined significance level of 0.05. Therefore, the intervention group saw a notable change in self-management among Type 2 DM patients in the Ulee Kareng Health Center region, Banda Aceh City, after being introduced to the plate meal strategy. In both the pretest and posttest control groups, the obtained Sig. (2 tailed) value was 0.369, which is greater than the significance level of 0.05. This indicates that there was no significant difference before and after self-management in Type 2 DM patients in the Ulee Kareng Health Center region, Banda Aceh City (Table 3).

The T-Independent analysis revealed a statistically significant value of 0.047 ($p < 0.05$) in light of these findings. This indicates that the null hypothesis (Ho) was rejected and the alternative hypothesis (Ha) was accepted. Consequently, there was a discernible disparity in the intervention group following the implementation of a diet program utilizing the plate meal method, as compared to the control group without any treatment. This information is presented in Table 4.

Table 1. Demographic Characteristics of Respondents (N=30)

Variables	Catergories	Intervention		Control	
		n	%	n	%
Age	Early Adulthood	2	13,3	0	0
	Late Adulthood	8	53,3	13	86,7
	Early Elderly	4	26,7	1	6,7
	Late Elderly	1	6,7	1	6,7
	Total	15	100,0	15	100,0
Gender	Man	0	0	0	0
	Woman	15	100,0	15	100,0
Education	Higher	1	6,7	2	13,3
	Middle	13	86,7	11	73,3
	Basic	1	6,7	2	13,3
	Total	15	100,0	15	100,0
Employment	Employment	1	6,7	2	13,3
	Unemployment	14	93,3	13	86,7
	Total	15	100,0	15	100,0
DM Duration	1-2 Year	3	20,0	3	20,0
	3-5 Year	9	60,0	11	73,3
	6-10 Year	3	20,0	1	6,7
	Total	15	100,0	15	100,0
DM Check within a month	Once a Week	2	13,3	1	6,7
	Once a Month	13	86,7	14	93,3
	Total	15	100,0	15	100,0
Consumption of DM medication	Yes	0	0	0	0
	No	15	100,0	15	100,0
DM diet program	Yes	0	0	0	0
	No	15	100,0	15	100,0

Table 2. The results of a univariate analysis comparing the frequency of intervention group and control group.

Self management	n	%	n	%
	Pretest Group with Intervention		Postest Group with Intervention	
High	1	6,7	5	33,3
Intermediate	8	53,3	9	60,0
Mild	6	40,0	1	6,7
Total	15	100,0	15	100,0
	Pretest Control Group		Postest Control Group	
High	1	6,7	3	20,0
Intermediate	12	80,0	10	66,7
Mild	2	13,3	2	13,3
Total	15	100,0	15	100,0

Table 3. Paired T-Test Results Pretest and Posttest Intervention Group and Control Group

Self Management	N	Mean	Std.Deviation	Std.Error Mean	Sig.(2 tailed)
Pretest - Postest (Intervention Group)	15	-7,750	4,528	1,601	.002
Pretest - Postest (Control Group)	15	-1,933	8,066	2,083	.369

Table 4. Results of the T-Independent Difference Analysis Research for the Intervention Group and the Control Group

Self Management test	N	Mean	Std.Deviation	t	Sig.(2 tailed)
Pretest Intervention group	15	36,60	7,908	-.796	.349
Pretest Control group	15	38,87	7,689		
Postest Intervention group	15	44,40	8,509	-.2,180	.047
Postest Self Control group	15	40,80	8,736		

DISCUSSION

The study results indicate that at the UPTD Ulee Kareng Health Center in Banda Aceh, there was a statistically significant difference in self-management values between the pretest and posttest in the intervention group after implementing the plate meal method. The difference in value for the intervention group was 0.002, suggesting a significant change in self-management before and after implementing the plate meal method. In the control group, the statistical analysis showed a value of 0.369, indicating that there was no significant difference observed before and after implementing the plate meal approach for self-management. It is important to note that no additional materials or pocketbooks were provided to the control group. According to the results of the independent t-test, a p value of 0.047 was obtained, which is less than the significance level of 0.05. This indicates that the null hypothesis (Ho) is rejected and the alternative hypothesis (Ha) is accepted. Therefore, it can be concluded that there is a significant difference in the self-management behavior of Type 2 DM patients depending on the plate meal technique. According to the statistical test results, the t value is -2.180 (positive value). This indicates that when the plate meal technique is given more frequently, self-

management continues to increase.

Implementing dietary restriction is an essential first measure in managing Type 2 DM. The objective of dietary regulation is to optimize insulin function and maintain stable blood glucose levels, with the purpose of minimizing the incidence of vascular problems and neuropathy. Regulating the diet can help attain normal glucose levels without experiencing hypoglycemia. It can also enhance patient knowledge and abilities and promote a preventative lifestyle to avoid issues related to diabetes mellitus (10).

The plate meal approach program is a well-documented form of dietary management that has shown significant benefits for those with DM. The plate meal method is a diet therapy program designed to help individuals with diabetes mellitus (DM) effectively manage their daily food intake. By providing guidance on the types of foods that are beneficial for DM patients, this program aims to empower individuals to take charge of their own care activities. Through increased knowledge and behavioral changes, patients can develop self-management skills, leading to improved quality of life.(11)

The plate meal technique is a dietary intervention that involves categorizing different types of food into certain portions on a plate. It also includes determining the appropriate calorie intake and adhering to a prescribed meal schedule daily. Patients can categorize their meals throughout the day into four main groups: 25% protein, 25% carbohydrates, 50% vegetables, and drinks and fruits. This dietary approach can be used as a therapeutic method to reduce blood glucose levels. It involves following a healthy and balanced menu that consists of appropriate amounts of carbohydrates, fats, and proteins, tailored to the patient's specific condition.(10)

Regulating one's diet is the primary factor in enhancing self-management among individuals with DM. The plate meal technique given to patients with diabetes mellitus (DM) encompasses essential understanding of DM, effective nutritional management as previously described, and instruction on the suggested diet to maintain ideal blood glucose levels. Self-management is a method for DM patients to independently control and handle themselves in order to address their illness symptoms. DM patients can engage in self-management by enhancing their knowledge, managing their nutrition, regulating their activities, taking care of their feet, and following treatment programs. This study examines the self-management control of patients in relation to their dietary management. The plate meal strategy can aid in regulating the diet of patients with DM. The plate meal approach facilitates patients' dietary management, hence enhancing self-care for individuals who initially struggled to maintain a healthy diet. This method simplifies patients' ability to take care of themselves. If patients with diabetes mellitus (DM) are able to adhere to all the components of the plate meal method, then their self-management behavior will be indirectly fulfilled. This is because the intervention group, which received treatment in the form of a controlled plate meal method every day for seven days, demonstrated support for this behavior. In contrast, the control group sought information on their own and only implemented it on the first and last days (12).

Furthermore, the self-management of patients with DM is impacted by their level of education and the duration of their DM diagnosis. The level of education is a determining element in an individual's knowledge, with higher education correlating to a greater level of care for health. On the other hand, those who have been afflicted with DM for an extended period typically possess a more extensive understanding of self-care. This knowledge can be used to obtain a more comprehensive understanding of DM care by utilizing diverse approaches or other informational platforms (13).

The study presents a diet method for individuals with type 2 diabetes mellitus (DM) that involves a plate meal approach. This method simplifies the diet by dividing food on a plate according to specific percentages, making it accessible

to all populations with type 2 DM. The study was unable to control for constraints during nighttime and did not determine the percentage of carbohydrates and protein accurately.(10)

CONCLUSION

The following can be concluded regarding the findings of this investigation:

The intervention group demonstrated a statistically significant improvement in self-management value, as indicated by a p-value of 0.002 obtained from pre- and post-intervention measures. In the control group, the p-value for self-management was 0.369. The statistical test findings revealed a p-value of 0.047 (<0.05), indicating a significant difference in the effectiveness of the plate meal approach diet program for self-management in patients with Type 2 DM at the UPTD Ulee Kareng Health Center in Banda Aceh in 2023.

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