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Improving Knowledge and Skills on Medical Nutrition Therapy in Type 2 Diabetes Mellitus Patients in Agricultural Communities

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Abstract

The prevalence of type 2 Diabetes Mellitus continues to increase, including in agricultural communities (farmers). Low treatment compliance can result in increased complications, morbidity and mortality. Medical nutrition therapy is one of the recommended diabetes control measures. Lack of education, understanding of diet, and family support causes many DM patients to not comply with diet therapy recommendations. The purpose of this activity is to provide health education (health promotion) regarding medical nutrition therapy for DM treatment to type 2 DM patients in the agricultural community, conduct a meal planning simulation (DM diet) that is in accordance with the condition of type 2 DM patients, and increase the knowledge and skills of type 2 DM patients in medical nutrition therapy. The method that will be used is health education (promotion) on medical nutrition therapy for type 2 DM patients and a meal planning simulation regarding the DM diet. The results of the evaluation of the implementation of community service showed that there was an increase in the knowledge of participants by 90% to a good knowledge, 10% of participants had a moderate knowledge, and no participants had a poor knowledge of the definition of DM, symptoms and signs, risk factors, treatment/therapy, disease prevention, prevention of complications, medical nutrition therapy/DM diet, exchange foods, recommended and not recommended foods for DM patients and myths and facts about type 2 DM. The average pre-test result was 52.5 and increased in the post-test result of 82. Based on the analysis using the Wilcoxon test, it was found that there was a statistically significant difference in the pre-test and post-test values of community service participants (p = 0.000). The activity of increasing knowledge and skills regarding medical nutrition therapy for type 2 diabetes mellitus patients in the agricultural community is a way to improve the ability of the community, especially type 2 DM patients, in managing medical nutrition therapy for type 2 DM, as an effort to prevent worsening and complications. The activity of increasing understanding and skills regarding medical nutrition therapy for type 2 diabetes mellitus patients in the agricultural community has proven effective.

Keywords: Type 2 DM; Improving understanding and skills; Medical nutrition therapy.

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Abstrak

Prevalensi Diabetes Melitus tipe 2 terus mengalami peningkatan, tak terkecuali para komunitas agrikultur (petani). Kepatuhan pengobatan yang rendah dapat mengakibatkan peningkatan komplikasi, angka kesakitan dan kematian. Terapi gizi medis adalah salah satu langkah pengendalian diabetes yang direkomendasikan. Kurangnya edukasi, pemahaman mengenai diet, dan dukungan keluarga menyebabkan banyak pasien DM tidak mematuhi rekomendasi terapi diet. Tujuan dari kegiatan ini adalah memberikan edukasi kesehatan (promosi kesehatan) mengenai terapi gizi medis pengobatan DM kepada para penderita DM tipe 2 di komunitas agrikultur, melakukan simulasi perencanaan makan (diet DM) yang sesuai dengan kondisi penderita DM tipe 2, dan meningkatkan pengetahuan dan keterampilan penderita DM Tipe 2 dalam terapi gizi medis. Metode yang akan dilakukan adalah dengan edukasi (promosi) kesehatan mengenai terapi gizi medis penderita DM tipe 2 dan simulasi perencanaan makan (meal planning) mengenai diet DM. Hasil evaluasi pelaksanaan pengabdian didapatkan bahwa terjadi peningkatan pemahaman peserta sebanyak 90% menjadi pemahaman yang baik, 10% peserta memiliki pemahaman cukup baik, dan tidak ada peserta memiliki pemahaman yang kurang mengenai definisi penyakit DM, gejala dan tanda, faktor risiko, pengobatan/ terapi, pencegahan penyakit, pencegahan komplikasi, terapi gizi medis/ diet DM, makanan penukar, makanan yang dianjurkan dan tidak dianjurkan bagi pasien DM serta mitos dan fakta seputar penyakit DM tipe 2. Rerata hasil pretes adalah 52,5 dan mengalami peningkatan di hasil postes yaitu sebesar 82. Berdasarkan analisis menggunakan uji Wilcoxon didapatkan bahwa terdapat perbedaan rerata yang bermakna secara statistik nilai pretes dan postes peserta pengabdian (p=0,000). kegiatan peningkatan pemahaman dan keterampilan mengenai terapi gizi medis pada pasien diabetes melitus tipe 2 di komunitas agrikultur ini merupakan cara untuk meningkatkan kemampuan masyarakat terutama pasien DM Tipe 2 dalam pengelolaan terapi gizi medis penyakit DM tipe 2, sebagai upaya untuk mencegah perburukan dan komplikasi.
Kegiatan peningkatan pemahaman dan keterampilan mengenai terapi gizi medis pada pasien diabetes melitus tipe 2 di komunitas agrikultur ini terbukti efektif.
Kata kunci: DM Tipe 2; Peningkatkan pemahaman dan keterampilan; Terapi gizi medis

INTRODUCTION

Diabetes mellitus (DM) is a collection of symptoms that arise in a person due to the body experiencing problems in controlling blood sugar levels. This disorder can be caused by inadequate insulin hormone secretion, impaired insulin function (insulin resistance) or a combination of both. Diabetes mellitus is a widespread problem because of its very high prevalence, increasing morbidity and the impact of costs incurred is getting bigger so that the level of community quality and community productivity are ineffective and reduced. Where people cannot work properly so that they get low income due to diabetes mellitus or other diseases (PERKENI, 2021).

Diabetes is a major cause of blindness, heart disease, and kidney failure. The Southeast Asian region where Indonesia is located is ranked 3rd with the highest prevalence of diabetes in the population aged 20-79 years among 7 regions in the world, with a prevalence of 11.3%. Indonesia is ranked 7th among 10 countries with the largest number of sufferers, that was 10.7 million. Indonesia is the only country in Southeast Asia on the list (Kemenkes RI, 2020). The 2018 Basic Health Research (Riskesdas) data showed that the prevalence of type 2 DM based on blood sugar examination results increased from 6.9 to 8.5% from 2013 to 2018. Meanwhile, in

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Lampung Province, the prevalence of DM sufferers was 1.37%, Pesawaran Regency was 0.98% or 1,168 people (Kemenkes RI, 2018).

The prevalence of DM in farmers in Indonesia has increased. According to occupation, farmers are ranked third in diabetes sufferers in Indonesia with a figure of 6.2%. Diabetes mellitus is also known as a silent killer because this disease is often not realized by patients and is known when complications have occurred (Kemenkes RI, 2014). A 35-year cohort study conducted on 6874 men in Sweden showed that subjects with lower-middle class jobs such as laborers had a 1.3 times higher risk of developing type 2 diabetes compared to upper-middle class jobs such as office workers. Risk factors associated with this are age, body mass index (BMI), hypertension, smoking habits and alcohol consumption (Hedén Stahl *et al.*, 2014).

Low medication compliance can result in increased complications and the risk of hospitalization. DM disease will have an impact on the quality of human resources and increase significant health costs, therefore all parties, both the community and the government, should participate in efforts to overcome DM, especially in prevention efforts. In the health service strategy for DM patients, the role of general practitioners is very important as the spearhead in primary health care. The role of patients and families in managing DM is also very important, because DM is a chronic disease that will be given lifelong treatment. Therefore, education is needed for patients and their families to provide an understanding of the course of the disease, prevention, complications, and management of DM. This will greatly help increase family participation in efforts to improve management outcomes. Patient compliance in taking medication and medical nutrition therapy plays a very important role in the success of their treatment to maintain blood glucose levels within the normal range (PERKENI, 2021).

Medical nutrition therapy is one of the diabetes control measures recommended by PERKENI. The principle of diet for DM patients is a balanced diet and according to the nutritional needs of each individual. Regularity of meal schedules, types and amounts of food are important to be conveyed and understood by DM patients (PERKENI, 2021). Lack of education, understanding of diet, and family support causes many DM patients not to comply with diet therapy recommendations (Laia, 2020; Mohammed *et al.*, 2020). This affects the patient's glycemic control, thus becoming an obstacle in achieving improvements in quality of life. Research shows that 62.5% of type 2 DM patients do not comply with recommended diet therapy and patients who comply with diet recommendations are 3.56 times more likely to have good glycemic control (Mohammed *et al.*, 2020). Research shows that out of 141 DM patient respondents, 85 people were not compliant with the diet and 80% of diabetes patients with poor blood sugar levels had low diet compliance (Laia, 2020).

Based on the research results in patients with type 2 DM in the agricultural community (farmers) in the work area of the Kalirejo Health Center, Pesawaran Regency, Lampung, it was found that compliance with medical nutrition therapy was still low, that was 20% (Angraini, Ernawati and Harmaina, 2024). This of course can cause uncontrolled DM, increasing the risk of complications, morbidity and mortality due to DM. Therefore, community service to Increase Understanding and Skills Regarding Medical Nutrition Therapy in Type 2 DM Patients in the Agricultural Community in patients with Type 2 DM in the agricultural community (farmers) in the work area of the Kalirejo Health Center, Pesawaran Regency, Lampung is very important to do in order to prevent complications, reduce morbidity and mortality due to DM.

GENERAL DESCRIPTION OF THE COMMUNITY, PROBLEMS AND TARGET SOLUTIONS

General description

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The prevalence of Type 2 DM in agricultural communities (farmers) has increased over time. Treatment/ therapy for DM consists of 5 pillars, that were education, medical nutrition therapy (meal planning), physical exercise, pharmacological intervention and regular blood sugar checks. Medical nutrition therapy has an important role in controlling Type 2 DM. Based on the results of previous studies, it was found that compliance with medical nutrition therapy for Type 2 DM patients in the agricultural community (farmers) in the working area of the Kalirejo Health Center, Pesawaran Regency, Lampung is still low at 20%. This can increase uncontrolled DM disease, increase morbidity and mortality of DM disease.

Tabel 1. Target description

No	Name of target	Characteristics of target	Amount	General problem or targets
1	Community target	Type 2 DM patients in agricultural communities	40	Health Sector

Problem

Improving knowledge and skills regarding medical nutrition therapy in Type 2 DM patients is very necessary to be done, as an effort to control blood glucose, prevent complications, reduce morbidity and mortality rates. The scope of this activity is type 2 DM patients in the agricultural community (farmers) in the working area of the Kalirejo Health Center, Pesawaran Regency, Lampung. Type 2 DM patients will be given health education through health promotion activities to improve their knowledge and skills in planning meals (medical nutrition therapy) which is one of the important stages of treatment in controlling Type 2 DM disease patients.

Tabel 2 Problem and solution

No	Problem	Solution	Indicators of goal
1	Low knowledge of medical nutrition therapy	Health Education/Promotion	Increase knowledge score
2	Low skills in diet management	Diet planning simulation	Increase skills

Target solution

The low compliance of medical nutrition therapy for type 2 DM patients in the agricultural community (farmers) requires an intervention to improve knowledge and behavior of therapy in type 2 DM patients, especially medical nutrition therapy. Medical nutrition therapy is one of the most important things in lifestyle modification of type 2 DM patients in an effort to control blood glucose so as to prevent complications, reduce morbidity and mortality due to type 2 DM, especially in the agricultural community (farmers).

The activity of Improving Knowledge and Skills Regarding Medical Nutrition Therapy for Type 2 DM Patients in the Agricultural Community (Farmers) in the Working Area of the Kalirejo Health Center, Pesawaran Regency, Lampung is very important to be carried out, in order to improve compliance with medical nutrition therapy for Type 2 DM patients. This activity will be carried out in 2 stages, that were education (health promotion) to all participants simultaneously regarding the importance of proper DM therapy, especially medical nutrition therapy; and simulation of meal planning (DM diet) that is in accordance with the condition of type 2 DM sufferers.

METHOD

The community service method for the activity of Improving Understanding and Skills Regarding Medical Nutrition Therapy for Type 2 DM Patients in the Agricultural Community (Farmers) in the Work Area of the Kalirejo Health Center, Pesawaran Regency, Lampung is:

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1. Health education (health promotion) regarding medical nutrition therapy for treating DM for type 2 DM patients in agricultural communities .
2. Simulation of meal planning (DM diet) that is appropriate to the condition of type 2 DM patients.

The stages of this community service activity consist of 2, that were Health education (health promotion) regarding medical nutrition therapy for treating DM for type 2 DM patients in the agricultural community and Simulation of meal planning (DM diet) that is appropriate to the condition of type 2 DM patients in the agricultural community.

RESULTS AND DISCUSSION

The community service activity "Improving Knowledge and Skills on Medical Nutrition Therapy for Type 2 DM Patients in the Agricultural Community (Farmers) in the Kalirejo Health Center Work Area, Pesawaran Regency, Lampung" consists of 2 stages of activities, that were health education (health promotion) regarding medical nutrition therapy for DM treatment for type 2 DM patients in the agricultural community and a simulation of meal planning (DM diet) that is in accordance with the conditions of type 2 DM patients in the agricultural community. The implementation of this community service activity was carried out in the Kalirejo Health Center Hall, Pesawaran Regency on Thursday, August 15, 2024 with 40 participants with DM from the agricultural community in the Kalirejo Health Center work area, Pesawaran Regency. This community service activity began with an opening by the master of ceremony (MC), remarks by the Head of the Kalirejo Health Center, remarks from representatives of the implementing team at 08.30 WIB to 09.00 WIB. After the opening, an initial evaluation was conducted through pre-test activities at 09.00 WIB to 09.15 WIB. After that, it was continued with the core activities, that were education and simulation. Educational activities consisting of 2 topics, that was an explanation of DM disease at 09.15 WIB to 10.30 WIB, and education on medical nutrition therapy at 10.30 WIB to 12.00 WIB, with an interactive lecture method accompanied by discussion. After the ishoma time (rest, prayer and meal) at 12.00-13.00 WIB, it was continued with a meal planning simulation activity (DM diet) that is in accordance with the condition of type 2 DM patients in the agricultural community at 13.00-15.00 WIB.

Health education is carried out by delivering material on the definition of DM disease, symptoms and signs, risk factors, treatment/therapy, disease prevention, prevention of complications, medical nutrition therapy/DM diet, exchange foods, recommended and not recommended foods for DM patients and myths and facts about type 2 DM disease. The provision of material is carried out using the interactive lecture method to participants of the activity who are patients of type 2 DM in the agricultural community using a power point as a material delivery media. The evaluation methods used in this activity are pretest, interactive discussion and posttest. The pretest is carried out with the aim of measuring the knowledge (prior knowledge) of participants by providing a questionnaire. The interactive discussion begins by giving participants the opportunity to ask questions and asking other participants to answer first, then the complete answers are given by the implementing team. In addition, interactive discussions are also carried out by giving several questions to participants as a form of feedback or feedback from the material that has been delivered. The posttest is carried out with the aim of measuring the final knowledge of participants after being given knowledge by providing a questionnaire.

Before the delivery of material on the definition of DM disease, symptoms and signs, risk factors, treatment/ therapy, disease prevention, prevention of complications, medical nutrition

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therapy/DM diet, exchange foods, recommended and not recommended foods for DM patients and myths and facts about type 2 DM disease, participants were given a written pretest on the material and a written posttest on the material that had been delivered. The results of the pretest questions were that approximately 25 people (62.5%) participants had poor knowledge, 15 people (37.5%) had moderate knowledge and none (0%) participants had a good knowledge of the definition of DM disease, symptoms and signs, risk factors, treatment/therapy, disease prevention, prevention of complications, medical nutrition therapy/DM diet, exchange foods, recommended and not recommended foods for DM patients and myths and facts about type 2 DM disease.

The results of the post-test questions showed that there was an increase in participants' knowledge, that were 36 people (90%) participants had good knowledge, 4 people (10%) had moderate knowledge and none (0%) participants had poor knowledge regarding the definition of DM, symptoms and signs, risk factors, treatment/therapy, disease prevention, prevention of complications, medical nutrition therapy/DM diet, exchange foods, recommended and not recommended foods for DM patients and myths and facts about type 2 DM. The percentage of understanding levels during the pre-test and post-test of participants is presented in Figure 1.

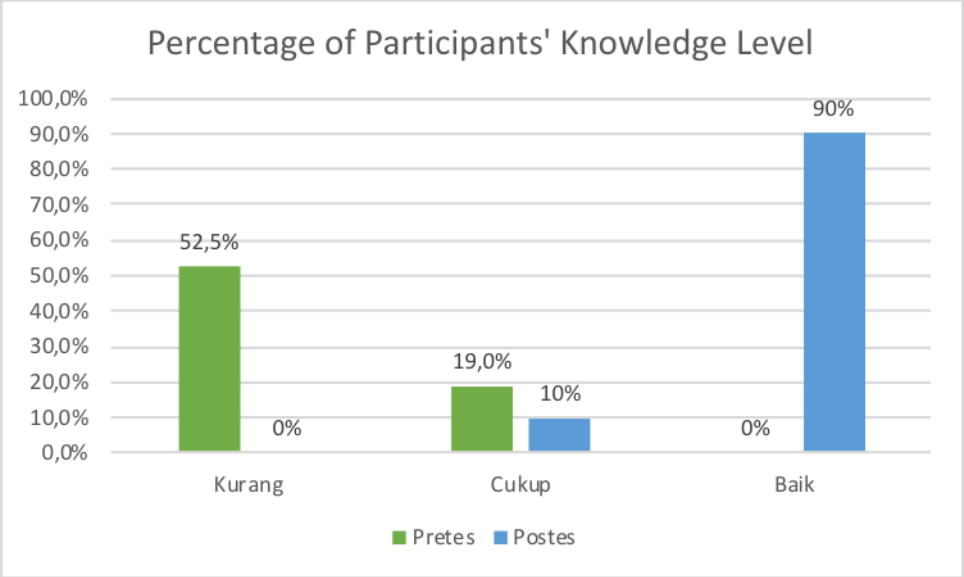

Figure 1. Overview of Participants' Level of Knowledge

Participants' knowledge based on having an average pretest score of 52.5 and a median score of 60, and increased during the posttest, namely an average posttest score of 82 and a median score of 83. Then an analysis was carried out using a paired 2-group mean test, that was the Wilcoxon test (because the data was not normally distributed) and a p value of p = 0.000 was obtained. This shows that the education provided regarding the definition of DM, symptoms and signs, risk factors, treatment/therapy, disease prevention, prevention of complications, medical nutrition therapy/ DM diet, exchange foods, recommended and not recommended foods for DM patients and myths and facts about type 2 DM, has been conveyed well and accepted and understood by the participants. An overview of the average and median values during the pretest and posttest of participants is presented in Figure 2.

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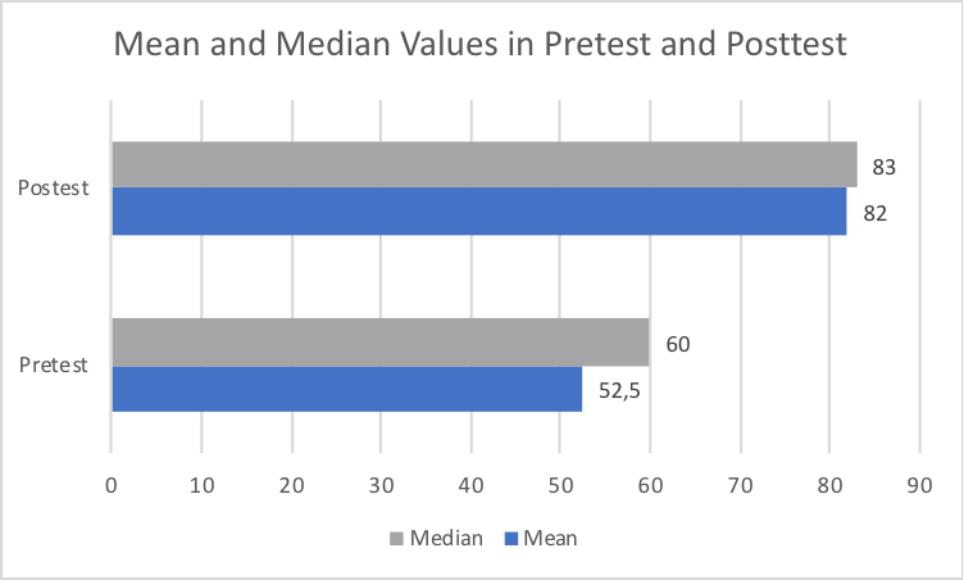

Figure 2. Mean and Median Values During Pretest and Posttest

Based on the pretest and posttest questionnaires given, it is known that there was an increase in knowledge and understanding of participants (type 2 DM patients in the agricultural community in the Kalirejo Health Center work area) regarding the definition of DM disease, symptoms and signs, risk factors, treatment/therapy, disease prevention, prevention of complications, medical nutrition therapy/DM diet, exchange foods, recommended and not recommended foods for DM patients and myths and facts about type 2 DM disease.

After the training activities with the delivery of materials and discussions, the next activity is a simulation of meal planning (DM diet) that is in accordance with the condition of type 2 DM sufferers in the agricultural community. In this activity, participants were very enthusiastic in conducting simulations and discussing medical nutrition therapy or DM diets that are in accordance with the condition of each patient. In this activity, patients directly simulate calculating nutritional status (body mass index/BMI), calculating total energy needs, determining the composition of carbohydrate, fat and protein needs; planning a daily food menu and choosing food ingredients that are in accordance with the condition of each DM disease. Evaluation was carried out at the end of the activity through discussion and almost 85% of participants understood how to determine and prepare a DM diet as medical nutrition therapy for the treatment of type 2 DM that they suffer from.

Diabetes mellitus is a metabolic disease characterized by hyperglycemia that occurs due to abnormalities in insulin secretion, insulin action or both. Metabolic disorders that occur in diabetes are chronic and require long-term therapy. In the management of diabetes, lifestyle changes towards a healthy lifestyle are important in an effort to achieve diabetes control. To achieve lifestyle changes towards a healthy lifestyle, structured and continuous education is needed for diabetes patients and their families. Based on the PERKENI consensus, the 5 pillars of DM management include: education, medical nutrition therapy, physical exercise, pharmacological therapy and self-monitoring of blood glucose (PERKENI (Perhimpunan Endokrinologi Indonesia), 2019).

Education plays an important role in the management of DM, why is DM education placed in the first four, because by providing education about diabetes mellitus, pillars 2 to 5 will be easy to understand and practice by people with diabetes. Diabetes education is a process designed to provide knowledge, skills, and support to individuals with diabetes or those at risk of developing

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diabetes, so that they can better manage their health conditions. Diabetes education involves information about diabetes, how to measure and control blood sugar levels, diet management, physical activity, stress management, and an understanding of the use of drugs or insulin (Collein, 2023).

Health education is a way to support health programs that can produce changes and increase knowledge in a short time. The concept of health education is a learning process for individuals, groups or communities from not knowing about health values to knowing, from being unable to overcome health problems to being able. Health education can play a role in changing the behavior of individuals, groups and communities in accordance with health values. The expected behavioral changes are to be able to maintain and improve health, prevent the risk of illness, protect oneself from the threat of disease, and actively participate in community health movements so that behavioral changes are the result of health education (Hasanica *et al.*, 2020).

Diabetes education can be provided by a health team, such as doctors, nurses, nutritionists, and diabetes educators who can be diabetics themselves. Diabetes education or education can be provided individually or in groups and can be adjusted to the needs and level of understanding of each individual. In Indonesia, individual education is usually carried out by a health team in the form of consultations, such as consultations with endocrinologists or nutritional consultations with nutritionists. Understanding and active involvement of individuals with diabetes in managing their own conditions is the key to success in managing diabetes well. While if done in groups, usually in some health centers in the form of prolanis (chronic disease management program) diabetes or hypertension or other degenerative diseases (Ernawati, Wihastuti and Utami, 2021).

The principles of diet therapy in patients with diabetes mellitus include balanced food with the number of calories according to body condition, the right time to eat and the type of food consumed, especially for patients who use insulin. This diet therapy helps control metabolic, lipid, and blood pressure in the body. The success of medical nutrition therapy in DM patients can be measured using dietary compliance indicators (Sami *et al.*, 2017).

Proper education for DM patients is a pillar of patient management as part of improving the quality of life of DM patients. Education involves communication activities between educators and patients. According to Roben JG., communication is a behavioral activity or activity of conveying messages or information about thoughts or feelings. Communication has several specific purposes. Among them are learning or teaching something, influencing someone's behavior, expressing feelings, explaining one's own or others' behavior, relating to others, solving a problem, achieving a goal, reducing tension and resolving conflicts, and stimulating interest in oneself or others (Ernawati, Wihastuti and Utami, 2021).

Some principles that need to be considered in the diabetes education process include providing positive support and advice, avoiding causing anxiety, conveying information gradually, starting with simple things and then with more complex things, using hearing-visual aids (Audio-Visual), prioritizing an approach by solving problems and conducting simulations, providing simple treatment so that compliance is easy to achieve, trying to compromise and negotiate, not forcing goals, providing motivation and appreciation and discussing laboratory results (Gómez-Velasco *et al.*, 2019).

Diabetes educators are defined as health professionals who master core knowledge and have knowledge in biology, social sciences, communication, counseling and have experience in caring for people with diabetes. The main responsibility of diabetes educators is education of people with DM, their families and their support systems regarding self-management and problems

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related to DM. This education process consists of at least topics including DM pathophysiology, nutrition and diet management, pharmacological interventions, activity and exercise, self-monitoring of blood glucose levels, prevention and management of acute and chronic complications, psychosocial adjustment, coping skills, stress management, and use of the health care system (Kolb, 2021).

This educational effort needs to be carried out in an integrated manner with other professions, including doctors, nurses, clinical psychologists, pharmacists and other health workers involved in patient care. We have implemented a group-based education strategy for DM patients in the UGM Community Service program in 2017. Education can be carried out collaboratively to obtain optimal results by creating a health class program attended by diabetes patients with a group system (5-10 people) (Yusmiyati, 2021).

Dietary compliance is the similarity of individual behavior with recommendations given by health workers related to dietary patterns and certain restrictions. However, in practice, dietary compliance is very difficult to implement. Nutritional knowledge is essentially a person's ability to understand concepts and principles and information related to nutrition, food and its relationship to health. Increased knowledge is followed by increased skills and attitudes and activities interact to form a distinctive behavioral pattern (Gherasim *et al.*, 2020).

Low levels of knowledge can be an inhibiting factor in compliant behavior in DM patients because patients will have difficulty following the recommendations of health workers. Medical nutrition therapy is a disease care management for patients that includes nutritional diagnostic steps, nutritional therapy, and nutritional counseling carried out by a registered dietitian (RD). Education for 2-12 months can improve HbA1C values by 15% in 70 people with DMT2 response (Yusmiyati, 2021).

Physical activity can reduce insulin resistance and blood glucose. If done regularly, it can prevent weight gain and play an important role in weight loss. Aerobic exercise can increase insulin response, thereby increasing blood glucose uptake into cells, while endurance exercise can increase muscle strength, reduce energy balance, thereby stimulating weight loss (Colberg *et al.*, 2016).

The amount, type, and schedule of carbohydrate intake are the main determinants that cause an increase in postprandial blood glucose levels. Meal portions affect the amount of available carbohydrates consumed. One method to regulate meal portions is to educate the amount of exchange using food model media or food samples. Another strategy that can be used is to use a food photo book or illustration accompanied by a scale, so that it can provide a more accurate picture of food portions. Digital food photos are useful as a medium to help memory during the 24-hour recall process and as a tool for estimating food portions (Dwipajati and Kaswari, 2024).

Counseling can increase patient knowledge, but has not been able to change patient behavior. Counseling to patients and families by providing examples of food photos, food portions, and carbohydrate counting provides a good understanding, and is expected to change the patient's eating patterns. Physical activity provides an understanding of the role of blood glucose uptake by muscles, in addition to increasing the flexibility of body parts (Brennan *et al.*, 2023).

CONCLUSIONS AND SUGGESTIONS

Activities to improve understanding and skills regarding medical nutrition therapy for type 2 diabetes mellitus patients in the agricultural community, this helps the community, especially DM patients in managing their disease, is able to improve the understanding and skills of DM patients in medical nutrition therapy according to the DM disease they suffer from. The results

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of the evaluation of the implementation of the community service found that there was an increase in participant understanding. We suggest that educational activities and simulations on medical nutrition therapy for DM patients need to be carried out continuously to continue to improve the skills and behavior of the community, especially Type 2 DM patients. We also suggest that the Health Service through the Health Center can improve the management of prolanis or similar activities for DM patients so that they can facilitate patients and families to better understand the management of their disease.

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