

# Impact of Health Education on Breadfruit Flour as a Carbohydrate Alternative for Diabetes

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**Abstract** Diabetes mellitus (DM) is a global health problem that is also a public health challenge in Indonesia, and the prevalence of DM has increased significantly. A healthy lifestyle is currently being promoted to prevent diabetes and control the disease, both through food and exercise. One alternative food ingredient to replace rice and wheat flour with a low glycemic index is breadfruit. Breadfruit has a glycemic index of 23-60 compared with wheat, so it can control blood sugar levels. The purpose of this activity is to provide knowledge about diabetes mellitus and healthy eating patterns or diets and to be able to make food for DM sufferers. The target of this activity is the mothers of cadres from all sub-districts in Utan Kayu Utara Village. The method of implementing the activity is through direct education and showing several videos on how to process breadfruit flour. Participants consisted of 30 cadres. They asked a lot of questions and discussed the material given enthusiastically. There was an increase in cadre knowledge about DM from 51 to 76 points. They were able to utilize breadfruit flour as an alternative source of carbohydrate nutrition for DM patients because they can make various cakes and snacks with a low glycemic index.

## 1. INTRODUCTION

Diabetes is a group of metabolic diseases characterized by hyperglycemia due to abnormalities in insulin secretion, insulin action, or both (American Diabetes Association, 2010). Hyperglycemia is when blood sugar is > 125 mg/dL when fasting and > 180 mg/dL 2 hours postprandial. Patients with impaired glucose tolerance (pre-diabetes) have fasting plasma blood sugar of 100 mg/dL – 125 mg/dL. Patients with diabetes usually have fasting blood sugar > 125 mg/dL (Mouri & Badireddy, 2022). When hyperglycemia is not treated, it can cause serious, life-threatening complications, such as damage to the eyes, kidneys, nerves, heart, and peripheral vascular system. Apart from that, diabetes mellitus patients with serious complications are also unable to carry out their usual activities, thereby increasing the burden on the family and causing economic losses because they require lifelong care (Prabowo et al., 2021).

The prevalence of diabetes mellitus globally increases every year, and the prevalence is higher in urban areas

(10.8%) than in rural areas (7.2%). (Saeedi et al., 2019). The International Diabetes Federation (IDF) estimates that the number of diabetes mellitus patients in Indonesia could reach 28.547 million in 2045. This number is 47% greater than 19.47 million people in 2021 (Pahlevi, 2021). The prevalence of diabetes mellitus in Jakarta, based on the results of Basic Health Research (RISKESDAS) in 2018, increased from 2.5% to 3.4% of the total 10.5 million people, or around 250 thousand residents in DKI Jakarta suffer from diabetes (Astuti, 2018). Data obtained from May 2023 from screening for DM complications included 47 patients at the Utan Kayu Utara Village Health Center, Matraman District, East Jakarta. The 2023 Indonesian Health Survey (SKI) report issued by the Ministry of Health reveals that entering the 7th month of July 2023, the figure has exceeded 10 percent of the latest Basic Health Research (RISKESDAS) data in 2018 (Badan Kebijakan Pembangunan Kesehatan Kemenkes, 2023).

Consuming foods that have a high glycemic index can

increase the prevalence of diabetes mellitus. Setting a healthy lifestyle is now encouraged to prevent diabetes and control the disease in diabetes patients (Yulia et al., 2023). One of the alternative food ingredients to replace rice and wheat flour, which has a low glycemic index, is breadfruit. Breadfruit has a glycemic index of around 25 – 60, indicating the potential to increase blood glucose from slow carbohydrates so that it can play a role in controlling blood sugar levels. This activity aims to increase public knowledge about DM disease and the benefits of breadfruit flour as an alternative product source of carbohydrates, as well as how to create innovations in breadfruit products for diabetes mellitus patients through counseling and questions and answers, as well as video shows.

This activity is often carried out in the community for teenagers, mothers, and other community groups. For example, community services in the cities of Tegal, Karang Anyar, and Sukoharjo Regency involve teenagers, mothers, and community leaders in education about the disease (Aisyah & Bestari, 2023; Latifah et al., 2024; Rosyid et al., 2019). Diabetes mellitus and its prevention and management have been proven to increase public knowledge. The lecture and demonstration method is a process to change behavior in the expected direction through the active participation of targets and exchanging experiences with fellow targets (Notoatmodjo, 2018).

## 2. METHOD

This community service activities focused on science, technology, and arts (IPTEKS) were conducted by lecturers from the Department of Pharmacy and Nutrition, Poltekkes Kemenkes Jakarta II. These activities prioritized programs requested by PKK partner groups and dasawisma groups in the North Utan Kayu Village area, Matraman District, East Jakarta. The program included community empowerment in soft skills related to the benefits of breadfruit flour as an alternative carbohydrate source for diabetes mellitus patients, as well as hard skills training on creating innovative food products from breadfruit flour. The activity, titled "Product Innovation from Breadfruit Flour as an Alternative Source of Carbohydrates for Diabetes Mellitus Sufferers in Utan Kayu Utara Subdistrict, East Jakarta in 2023," was selected to provide the target group with knowledge and skills in utilizing breadfruit flour (glycemic index (GI) = 23-60) as a healthier alternative to rice (GI = 88-90) and wheat flour (GI = 85-90).

Activities to improve behavior were carried out by empowering soft skills through counseling about the benefits of breadfruit flour as an alternative carbohydrate source for diabetes mellitus patients. The training also emphasized the importance of hard skills in making products from breadfruit flour. Participants were actively involved in both aspects, which aimed to increase their knowledge, behavior, and skills. The learning methods included lectures, question-and-answer sessions (presentation/counseling), and practical exercises. Active learning was used to help participants retain information better. This method involved hands-on experience and

visual observation. Tutors and facilitators acted as guides during discussions. Community service lecturers provided additional information as needed. Students were involved as tutors in the process. Lecturers and education staff at Poltekkes Jakarta II served as facilitators. Sub-district cadres, along with participants, had the opportunity to become tutors for the community in their area.

After this community service activity ended, it was hoped that the community would develop an understanding of diabetes mellitus. They were expected to utilize breadfruit flour in a low-glycemic index diet for diabetes mellitus patients as an alternative carbohydrate source to replace rice and wheat flour. Furthermore, the community was anticipated to innovate products made from breadfruit flour and use them to implement a healthy diet for the prevention and control of diabetes mellitus.

## 3. RESULT AND DISCUSSION

This community service activity was carried out in collaboration with North Utan Kayu Village, East Jakarta City, DKI Jakarta. It was carried out smoothly in the village hall on Friday, June 14, 2024. The activity participants were a group of PKK and dasawisma cadres totaling 30 people. This activity was carried out to increase public knowledge regarding diabetes mellitus and the use of breadfruit flour as an alternative food for diabetes mellitus sufferers

Consuming 189 g of cooked breadfruit can provide almost 57% of the fiber, more than 34% of the protein, vitamin C, and copper, about 28% of the potassium and manganese, and 5.75–11.5% of the iron, calcium, and phosphorus of the daily dietary allowance are recommended (Liu et al., 2020). Breadfruit reduces blood glucose levels (Ajiboye et al., 2017; Diantari et al., 2023; Simanjuntak & Gurning, 2020). Breadfruit flour has a low glycemic index, which is beneficial as an alternative food source for diabetes sufferers (Fitriani et al., 2021).

This education aimed to change people's behavior through widespread and extensive dissemination of information, communication, and motivation by instructors, both orally and in writing. The lecture and demonstration methods were used as a process to guide behavior change in the desired direction through the active participation of participants and the exchange of experiences with fellow participants (Notoatmodjo, 2018).

This activity began with education and was carried out directly through counseling for the PKK & Dasawisma cadre groups present that day. The sub-district head, Mrs. Rahma Edwina, SIP., gave the opening remarks, followed by counseling and a question-and-answer session with the participants. The attendees expressed their hope that this activity could be held regularly to promote health and provide education and relevant information related to health. The process of implementing the community service activities can be seen in Figure 1.

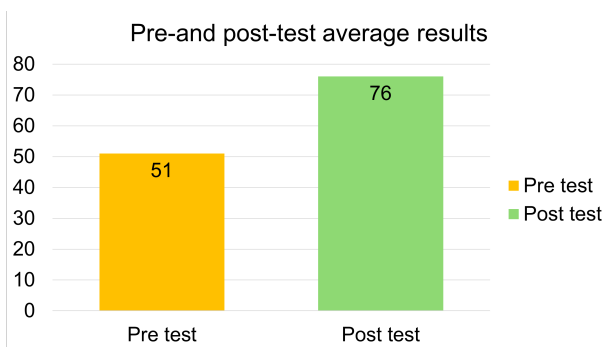
Before the activity began, the participants were asked to fill out a pretest questionnaire to measure the participants' initial knowledge regarding knowledge. The questionnaire consisted of five statements related to diabetes mellitus

and five questions about breadfruit flour as an alternative carbohydrate source.



**Figure 1 .** Diabetes education and the use of breadfruit flour as an alternative food

Afterward, participants received direct education about diabetes mellitus and using breadfruit flour as an alternative carbohydrate source. At the end of the session, participants took the posttest, which contained the same 10 questions as the pretest. The pre and posttest results are shown in **Figure 2**. The pre and posttest questions were multiple choice, consisting of five questions about diabetes mellitus and its symptoms, and five questions about the diet for diabetes mellitus patients and breadfruit flour.



**Figure 2 .** Average results of knowledge about diabetes mellitus and the use of breadfruit flour as an alternative carbohydrate source

The pretest and posttest results also showed that the participants' knowledge increased by 25 points (from 51 to 76); some participants were even able to answer correctly all their knowledge of diabetes mellitus and the use of breadfruit flour as an alternative carbohydrate source. This shows that education about diabetes mellitus and using breadfruit flour as an alternative carbohydrate source can increase patient knowledge and awareness about the disease and provide knowledge about alternative sources of carbohydrates, namely breadfruit flour, for diabetes mellitus sufferers.

The data shows that the objective of this community service activity program have been achieved, namely increasing the knowledge and skills of cadre mothers of the PKK & dasawisma group, Utan Kayu Utara Village, East Jakarta City, regarding diabetes mellitus and the use of breadfruit flour as an alternative carbohydrate source.

Based on the results of the pretest questionnaire, it can be identified that many participants do not understand the side effect of insulin that needs to be watched out for, namely hypoglycemia (blood glucose concentration below the normal range). Hypoglycemia has been a complication of insulin treatment since the early days of insulin discovery, and remains a major concern for people with diabetes, their families and health professionals today. Acute hypoglycemia stimulates a stress response that acts to restore circulating glucose, but plasma glucose concentrations can still drop too low to maintain normal brain function and heart rhythm. There are long-term consequences of recurrent hypoglycemia, which are symptoms of stress, impaired response to subsequent hypoglycemic episodes, impaired cognitive function, impaired memory formation and consolidation, cardiovascular effects, psychological impacts, and even death (Amiel, 2021).

Most of the participants knew the answers to the questions about the symptoms and factors that cause DM disease. Many people have also understood the question about the blood sugar levels of DM patients. However, there is another question that is difficult for them to answer during the pretest is about the mechanism or way of reducing blood glucose levels that occurs with the administration or consumption of foods containing breadfruit flour.

After providing counseling, the participant's score of correct answers on the posttest questionnaire increased for each question. It can happen because information to increase knowledge is provided correctly or through educational media (Ramadhanti et al., 2019). In this activity, the two educational media used are direct counseling and video. Public understanding of DM and its diet through counseling and providing information using video media can increase public knowledge to be more effective. This media has advantages including being easier to understand and more interesting because there are sounds and images (Luthfiani et al., 2021).

## 4. CONCLUSION

The education about diabetes mellitus and the use of breadfruit flour as an alternative source of carbohydrates successfully increased patients' knowledge and awareness about the disease. It also provided valuable information about using breadfruit flour as an alternative carbohydrate source for diabetes mellitus sufferers in Utan Kayu Utara Village, East Jakarta. Furthermore, it is essential to offer more frequent education on diabetes mellitus and lifestyle changes, especially regarding diet, to both patients and their families.

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## CONFLICT OF INTERESTS

All authors declare that there was no conflict of interest in this community service program.

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