



# Community Service Journal of Indonesia

Division of Research and Community Service  
Kerta Cendekia Nursing Academy

<https://ejournal-kertacendekia.id/index.php/csji/index>

Community Service Journal of Indonesia 7 (2) (2025):

Doi: <https://doi.org/10.36720/csji.v7i2.836>

## COMMUNITY-BASED EDUCATION ON HEALTHY SNACK CHOICES TO PREVENT EARLY DIABETES AMONG STUDENTS OF AL-HIKAM ISLAMIC BOARDING SCHOOL, BANGKALAN

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Received: November 25<sup>th</sup>, 2025 ; Revised: December 19<sup>th</sup>, 2025 ; Accepted: December 22<sup>nd</sup>, 2025

### ABSTRACT

Diabetes mellitus (DM) is one of the global health threats, and in Indonesia, the prevalence of DM continues to increase every year. The risk factors for DM that are currently challenging are an unbalanced lifestyle, including the habit of consuming snacks high in sugar. Situation analysis shows that students at Islamic boarding schools have limited knowledge about diabetes and often enjoy snacks without considering their sugar content. On the other hand, sweet potatoes grow abundantly in the environment of the Al-Hikam Bangkalan Islamic boarding school. Sweet potatoes are known to have a low glycemic index and are high in fiber, making them a healthy snack alternative to prevent the risk of diabetes. The purpose of this community service is to introduce healthy snacks for diabetes to prevent the early risk of diabetes among students at PP. Al-Hikam Bangkalan. This community service used an observational analytical method in processing questionnaire data. Activities included counseling on the dangers of DM and healthy anti-diabetic snacks. The Participants consisted of 51 male and female students at PP. Al-Hikam Bangkalan, which began with a pre-test, continued with the delivery of material, and ended with a post-test as an evaluation. The results of the Wilcoxon signed rank test showed an increase in the knowledge of the participants, with a pre-test average score of 31 and a post-test average score of 64, representing a significant increase ( $P < 0.001$ ). The conclusion is that students were able to understand diabetes mellitus and recognize healthy anti-diabetic snacks after receiving counseling, so it is hoped that students can maintain a balanced diet and make healthy snacks as an alternative to snacks so that they can prevent diabetes early on.

Keywords: Diabetes Mellitus, Healthy Snacks, Islamic Boarding School, Students, Sweet Potatoes

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**E-ISSN**  
2684-7884  
**P-ISSN**  
2774-4027

## INTRODUCTION

Diabetes mellitus (DM), often referred to as diabetes, is a group of metabolic disorders characterized by elevated blood glucose levels (hyperglycemia) due to impaired insulin secretion, impaired insulin action, or a combination of both (PERKENI, 2021). Based on data from the 2018 Riskesdas, the prevalence of DM in Indonesia reached 8.5% or 20.4 million people in Indonesia diagnosed with DM, and the WHO predicts that this number will continue to increase, reaching 21.3 million by 2030 (Kemenkes, 2019; PERKENI, 2021).

Poor lifestyle choices, such as an unbalanced diet and lack of physical activity, can be risk factors for diabetes (Irwansyah & Kasim, 2021). Consumption of foods high in simple carbohydrates, sugar, saturated fats, and low in fiber can increase blood glucose levels (Clemente-Suárez, et al., 2022). The fiber content in food can reduce the body's glycemic response to consuming carbohydrate-rich foods and can help delay the absorption of glucose and lipids in the intestines (Makki, et al., 2018; Giutini et al, 2022). One good source of fiber is sweet potatoes. Sweet potatoes have a low glycemic index (GI) of 44, which is lower than rice (51), potatoes (74), and corn (59). Consuming foods high in fiber, amylose, and low GI can improve insulin sensitivity and control blood glucose, which is beneficial for preventing complications of type 2 diabetes (Avianty & Ayustaningwarno, 2013).

The results of the 2015 Global School Health Survey show that adolescents' eating habits are still poor, characterized by a tendency not to eat breakfast regularly (65.2%), low consumption of vegetables and fruits as sources of fiber (93.6%), and high consumption of foods with added flavor enhancers (75.7%). In addition, nearly half of adolescents (42.5%) have a sedentary lifestyle characterized by minimal physical activity (Ministry of Health, 2018). Students at Islamic boarding schools, who are predominantly adolescents, are a community group at risk in terms of dietary patterns.

The results of a situation analysis conducted at the Al-Hikam Islamic Boarding School in Bangkalan found that most students consume fried foods and sweet drinks available around the boarding school. The students' busy daily schedule exacerbates this habit, causing them to often delay meals and rely more on unhealthy snacks. This condition increases the risk of early diabetes mellitus and can have an impact on long-term health.

Based on these conditions, this community service program was carried out at the Al-Hikam Islamic Boarding School in Bangkalan with the aim of introducing and providing education related to diabetes-friendly snacks made from sweet potatoes. Sweet potatoes were chosen because they are easily found in the boarding school environment, have a low glycemic index, and are high in fiber. It is hoped that through this activity, the

students' knowledge and awareness of the risks of diabetes will increase, as well as the importance of a healthy diet and having nutritious snack alternatives that have the potential to prevent the risk of diabetes mellitus from an early age.

## **OBJECTIVES**

### *General Purpose*

Conducting community service through educational outreach on healthy snacks for diabetics to prevent early-onset diabetes among students at the Al-Hikam Islamic boarding school in Bangkalan.

### *Special Purpose*

1. Introduce students to snacks that are good for diabetics and have the benefit of making them feel fuller for longer
2. Encourage students to take early preventive measures against diabetes mellitus

## **PLAN OF ACTION**

This activity was carried out in May 2025 at the Al-Hikam Islamic Boarding School in Bangkalan. This community service activity was carried out on 51 male and female students at the Al-Hikam Islamic Boarding School in Bangkalan. The stages of community service are as follows:

### 1. Preparation stage

The preparation stage of the program began with a survey and discussion to obtain the information needed to increase the target audience's interest and the quality of the program provided.

### 2. Implementation of counseling

This community service activity was carried out by providing counseling on healthy anti-diabetic snacks, in collaboration with the boarding school

administrators and the local health center. Before the activity took place, participants first filled out a pre-test questionnaire. The counseling material provided patients with explanations about diabetes mellitus, risk factors and prevention, as well as an introduction to healthy snacks as an alternative to anti-diabetic snacks. At the end of the counseling, a post-test questionnaire was given to assess the increase in knowledge.

### 3. Evaluation and reporting

Evaluation and reporting include evaluating the success of the program and reporting the results to the boarding school leadership, as well as writing a program report to be published in a community service journal.

The program evaluation is conducted before (pre), during (durante), and after (post). The program evaluation includes:

1. Knowledge change indicators
2. Participant attendance indicators
3. Activity indicators

## **RESULTS AND DISCUSSION**

The Healthy Snack Introduction Program for Diabetes Prevention in Early Diabetes Risk Among Students at Al-Hikam Islamic Boarding School in Bangkalan has been successfully implemented. The event was held on Saturday, May 3, 2025, for 51 students and boarding school administrators. The event was attended by the board of administrators and the boarding school supervisor, who participated enthusiastically. The activity took place from 9:00 a.m. to 12:00 p.m.

The students arrived on time and followed the program from start to finish. Before the seminar began, participants were given leaflets containing information on "healthy anti-diabetes snacks." The

students were active and enthusiastic throughout the seminar. They also appeared enthusiastic about the material presented. The most active participants and those with the highest pre-test and post-test scores in the educational session were given awards. The event ran smoothly from start to finish. At the closing of the event, a group photo was taken with the participants of the educational session.



**Figure 1.** Group photo with the most active participants, highest pre-test and post-test scores



**Figure 2.** Leaflet entitled “Healthy Anti-Diabetes Snacks” distributed to participants during the educational session.

Before and after the counseling session, participants were given a questionnaire on santri knowledge of diabetes mellitus. The results of the counseling session were as follows:

**Table 1.** Results of the Wilcoxon rank test on students' knowledge of diabetes mellitus and healthy eating patterns

	Mean	Std. Deviasi	Min	Max	-P-value
Pre-Test	31,3	15,7	0	30	<0,001
Post-Test	64,7	18,2	30	100	

The average pre-test score was 31.3, while the average post-test score was 64.7. There was an increase of 33.3 from before the material was given (pre-test) to after the material was given (post-test). Based on the results of the statistical analysis above, there was a significant increase in the post-test score compared to the pre-test. This indicates an increase in students' understanding of the risks of early diabetes and the importance of a healthy diet. Before the counseling, the students did not fully understand the negative effects of consuming foods high in sugar and low in fiber on long-term health. These results are in line with the community service conducted by Istyi'aroh, et al (2022) on Early Diabetes Mellitus Prevention Education: Community Service at the Nyamplungsari Qur'an Tahfidh Islamic Boarding School in Pemalang, Central Java. The results of the counseling showed an increase in understanding of early diabetes mellitus prevention in the good category, from 68.4% to 83.2%.

Type 2 diabetes mellitus now affects not only adults but also adolescents, mainly due to changes in lifestyle and unhealthy eating patterns (Andrew, 2024). One of the main contributing factors is excessive consumption of foods high in sugar, saturated fat, and simple carbohydrates. This habit is also found in the Al-Hikam Islamic Boarding School in Bangkalan,

where students tend to consume fried snacks and sweet drinks due to limited time and access to healthy foods.

The management and prevention of diabetes mellitus through a dietary approach emphasizes the importance of choosing healthy snacks to help control blood sugar levels. A number of studies have reported that the use of functional foods in the daily diet can improve glycemic regulation while reducing the risk of type 2 diabetes. One of the main aspects that needs to be considered in choosing snacks for individuals at risk of diabetes is the glycemic index (GI) value, which is a measure of the extent to which carbohydrate foods affect blood glucose increases. Consumption of foods with a low GI is highly recommended because they produce a slower increase in glucose, making them more effective in maintaining stable blood sugar levels. Additionally, snacks rich in fiber, whole grains, and high in protein provide additional benefits. For example, high-protein snacks have been shown to increase feelings of fullness and reduce food intake, ultimately supporting optimal blood glucose control (Yang et al., 2021; Olagunju et al., 2023).

Education aimed at promoting healthy living needs to be carried out as part of diabetes prevention efforts. One healthy lifestyle behavior can be achieved by following a healthy diet. According to PERKENI (2021), the recommended food composition consists of: carbohydrates amounting to 45-65% of total energy intake, fat intake of around 20-25% of calorie requirements, and no more than 30% of total energy intake, as well as fiber consumption of 20.35 grams per day (PERKENI, 2021). Diet education is nutrition education with an approach that

disseminates nutritional information based on the principles of nutritional science in the form of information relevant to the problems faced, such as how to choose nutritionally balanced foods, eating habits, dietary restrictions related to various diseases, and maintaining ideal body weight according to Contento Isobel (Supriasa, 2012).

Thus, the introduction of healthy diabetes snacks based on sweet potatoes not only provides nutritional benefits but also serves as an effective educational tool in preventing the risk of early-onset diabetes. It is hoped that this initiative will be the first step in fostering a culture of healthy consumption within the boarding school environment and supporting the long-term health of the students.

## CONCLUSION

Introducing healthy anti-diabetes snacks to students at the Al-Hikam Islamic Boarding School in Bangkalan has increased their knowledge about diabetes mellitus and healthy anti-diabetes snacks after receiving education on the subject. This activity is expected to encourage healthier snacking habits, maintain a balanced diet, and promote healthy snacks as an alternative to unhealthy snacks, so that students have an understanding and habits that support the prevention of diabetes mellitus from an early age.

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