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## Provision of Vitamin C and Vitamin D Foodstuffs Against the Reduction of Blood Glucose Levels in Diabetes Mellitus Type II Indicated Respondents

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### A B S T R A C T

This community service was carried out to improve the knowledge of Kutisari residents who identified had diabetes mellitus. Preliminary study was conducted regarding residents who identified with diabetes mellitus with deficiency of vitamin C and vitamin D intake. This community service program lasts for one year. The activity in this community service was collecting the data of respondents with diabetes mellitus, gave nutrition counseling, and directly provided food sources of vitamin C and vitamin D. Besides provided leaflets of vitamin C and vitamin D food sources, the nutrition counseling also measured respondent's blood sugar levels. Checking blood glucose levels was carried out to determine the glucose levels of residents who were identified as having diabetes mellitus. Intake of food sources of vitamin C and vitamin D were expected to lower blood glucose levels. The respondent received guava and chicken eggs as the food source of vitamin C and vitamin D. The purpose of this community service is to improve the respondent's knowledge about the food sources of vitamin C and vitamin D. Those foods will reduce the high blood glucose levels close to the normal values. The output of this community service activity is an online-published report.

## INTRODUCTION

Diabetes Mellitus is a chronic progressive disease characterized by blood glucose levels increase (hyperglycemia) due to decreased secretion function or decreased function of insulin secretion which causes insulin resistance. A person with diabetes mellitus experiences metabolic abnormalities, namely carbohydrates, proteins and fats due to a lack of insulin in the tissues (American Diabetes Association, 2013). Diabetes mellitus is characterized by the occurrence of oxidative stress, inflammation, and pancreatic  $\beta$  cell dysfunction. Diabetes mellitus is a disease that causes an increased risk of death and decreased quality of life due to serious complications (Price, Sylvia Anderson, 2005).

According to the International Diabetes Federation (IDF), Indonesia is predicted to experience a 2-fold increase in the prevalence of diabetes mellitus in 2030. Meanwhile, according to Basic Health Research data 2013 and 2018, it showed that diabetes mellitus sufferers in Indonesia have increased by 1.3% from 2013 by 2.1% to 3.4% in 2018. According to the World Health Organization (WHO) in 2014, the death rate due to diabetes mellitus was 1.9%, this figure will increase in 2030 to 3.3% or around 22 million deaths due to diabetes mellitus (Ministry of Health, 2014). According to the International Diabetes Federation (IDF) in 2019 around 483 million people suffered from diabetes mellitus at the age of 20-79

years or equivalent to a prevalence of 9.3% of the total population at the same age. According to the International Diabetes Federation (IDF) in 2019 around 483 million people suffered from diabetes mellitus at the age of 20-79 years or equivalent to a prevalence of 9.3% of the total population at the same age (Fandinata & Ernawati, 2020).

Conditions of insulin resistance or metabolic syndrome and diabetes mellitus 2 cause lipid metabolism disorders characterized by an increase or decrease in the lipid fraction in blood plasma (dyslipidemia). Dyslipidemia can cause oxidative stress, this condition occurs due to disruption of lipoprotein metabolism which is often referred to as the lipid triad including an increase in the concentration of Very Low-Density Lipoprotein (VLDL) or triglycerides, a decrease in the concentration of High-Density Lipoprotein (HDL), and the formation of small dense low-density lipoproteins (LDL) which is atherogenic (Shahab, 2006).

Diabetes mellitus can occur due to vitamin D deficiency. In people with type 2 diabetes mellitus, insulin injection can be done but it cannot work optimally to help the body's cells absorb glucose (Micic & Cvijovic, 2008). Vitamin D deficiency can be overcome in a simple way, namely sunbathing therapy in the morning with the appropriate time limit. Vitamin D is often known as the sun vitamin because vitamin D can be formed by the body with the help of sunlight. If the body gets enough sunlight, then consumption of vitamin D through food intake is not needed. Vitamin C is a micronutrient that has an important role in human plasma as an antioxidant. Vitamin C is water-soluble and can fight free radicals (Frykberg, 2002). The function of vitamin C is as an electron donor or an electron reducing agent so that it can act as an antioxidant (Gropper, Smith, & Groff, 2013).

Preliminary studies have been carried out and data obtained that the Kutisari community was identified with diabetes mellitus. Many people who have identified diabetes mellitus do not understand foodstuffs that can reduce blood glucose levels. Efforts are being made to provide food sources of vitamin C and vitamin D and booklets about these foodstuffs. Considering that there is still a lack of understanding about diabetes mellitus and foodstuffs that can reduce it, this phenomenon motivates the author to carry out a community service titled "Provision of Vitamin C and Vitamin D Foodstuffs against the Reduction of Blood Glucose Levels in Diabetes Mellitus Type II Indicated Respondents".

## **METHOD**

Implementation in this community service activity includes several parts or stages including the following:

Stage 1 Coordination

Coordination was carried out with the head of the Citizens Association (RW) or the head of the Neighborhood Association (RT) to request permission to carry out community service activities and request for the respondents' data.

#### Stage 2 Preparation of facilities and infrastructure

A preparatory meeting was held between the community service team. Matters discussed include:

- a. Arranged a schedule for the implementation of health promotion activities by providing food sources of vitamin C and vitamin D as well as booklets of these food ingredients.
- b. Reminded back checking blood glucose levels.
- c. If there was a change in schedule or problems during the implementation of the giving, the officer should communicate it with other service teams, especially if the service team could not participate in all outreach activities.

#### Stage 3 Implementation of Action Activities

The most important program content in this program was the provision of health promotion in the form of socialization of the provision of food sources of vitamin C and vitamin D along with booklets through online media.

#### Stage 4 Evaluation

At the evaluation stage, the community were given feedback about the programs that have been implemented. This will be a consideration for our activities to benefit the community. This community service will be carried out by the following mechanisms:

- a. Analyzed blood glucose levels of people identified with diabetes mellitus.
- b. Intervention in community service was carried out using health promotion methods by providing food sources of vitamin C and vitamin D along with booklets. With this health promotion, it was hoped that the community could control blood glucose levels.
- c. Analyzed people's understanding of diet, especially those sourced from vitamin C and vitamin D.

## RESULT AND DISCUSSION

The results were achieved from the implementation of community service program activities, namely Provision of Food Sources of Vitamin C and Vitamin D against Decreasing Blood Glucose Levels in Respondents Indicated of Type II Diabetes Mellitus.

### A. Overview of the Research Location

Community service was carried out at RT 09 RW 03, Kutisari Village, Surabaya. Kutisari Urban Village has the largest population among all the villages in Tenggilis Mejoyo District, Surabaya. This community service was conducted by distributing food sources containing vitamin C and Vitamin D as well as

distributing booklets to respondents who have indicated Diabetes Mellitus. Before knowing the respondent who has Diabetes Mellitus, the glucose level was checked which was taken randomly with the permission given by the Head of the local Neighborhood Association.



Picture 1 Territory of RT 09 RW 03 Alley 7 (Source: *Google maps*,2020)



Picture 2 Territory of RT 09 RW 03 Alley 7 (Source: Primary Data, 2020)

## B. Characteristics of Respondents

The respondents were determined based on the gender on community service was chosen randomly. Meanwhile, for the distribution of foodstuff sources were to all respondents.

Table 1 Frequency Distribution of Respondent Characteristics by Gender

No	Gender	Frequency (N)	Percentage (%)
1	Men	14	36
2	Female	25	64
Amount		39	100

Based on the data presented in table 1, it was found that the characteristics of respondents based on gender were mostly women as many as 25 respondents (64%). The results of this community service were the same as the research conducted by (Nauli, 2015) which stated that women had twice the risk of being exposed to diabetes mellitus when compared to men. This was confirmed by Irawan's opinion which stated that women have monthly cycles and menopause which can increase the accumulation of the

amount of fat in the body so that women are at greater risk of developing diabetes mellitus (Irawan, 2010).

### C. Characteristics of Respondents based on Examination of Blood Glucose Levels

The examination of blood glucose levels for each respondent was only carried out once.

Table 2 Distribution of Blood Glucose Levels Examination

No	Blood Glucose Levels	Frequency (N)	Percentage (%)
1	< 200 mg/dl	19	49
2	>200 mg/dl	20	51
Amount		39	100

Based on the data presented in table 2, it was found that 20 respondents (51%) were in the pre-diabetes mellitus category. Some of the respondents handled diabetes mellitus by taking medication, changing their diet, and doing physical activity (sports). Whereas handling is done by consuming lots of foods that contain vitamin C and vitamin D. Food ingredients that contain vitamin D consumed by respondents are derived from soybeans, namely tofu and tempe, and eggs. This is in line with Mitri's research, which states that vitamin D is an important contributor to insulin resistance, which is a mechanism for type 2 Diabetes Mellitus (Mitri, Muraru, & Pittas, 2011). Conversely, if the intake of vitamin D is higher, it can increase diet-induced thermogenesis and fat oxidation and reduce spontaneous energy intake. Apart from Vitamin D, Vitamin C also has a very important role for people with diabetes mellitus. The food ingredients consumed by respondents are papaya, oranges, apples and guava. This is in line with the study of Wulandari, she states that the intake of vitamin C with a decrease in blood glucose levels in diabetes mellitus sufferers is because vitamin C can increase insulin sensitivity and can reduce blood glucose levels. Vitamin C reduces glucose toxicity and has a contribution in preventing beta-cell mass decline, and an increase in the amount of insulin in the body, as well as vitamin C, can also play a role in modulating the action of insulin in people with diabetes mellitus, especially in metabolizing non-oxidative glucose (Wulandari, 2018).

## CONCLUSION

The community service activities carried out can be concluded as follows: Some of the Kutisari Village's respondents are female. Most of the Kutisari Village's respondents suffer from diabetes mellitus. The education provided is a source of foodstuffs containing vitamin C and vitamin D.

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