



THE EFFECT of TOMATO JUICE AND DRAGON FRUIT JUICE ON 2-HOUR POST PRANDIAL BLOOD GLUCOSE LEVELS IN TYPE 2 DIABETES MELITUS PATIENTS IN BAKULAN VILLAGE, KEMANGKON DISTRICT

PENGARUH PEMBERIAN JUS TOMAT DAN JUS BUAH NAGA DALAM MENURUNKAN KADAR GLUKOSA DARAH 2 JAM *POST PRANDIAL* PADA PASIEN DM TYPE 2 DI DESA BAKULAN KECAMATAN KEMANGKON

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Abstract

Background: Type 2 diabetes mellitus is a chronic metabolic disorder characterized by elevated blood glucose levels due to insulin resistance or impaired insulin secretion. One effort to help lower blood glucose levels is through complementary therapy using natural ingredients such as tomato juice and dragon fruit juice, which contain various active compounds such as lycopene, fiber, vitamin C, and antioxidants. Objective: To determine the effect of tomato juice and dragon fruit juice on 2-hour post prandial blood glucose levels in type 2 diabetes mellitus patients. Methods: This research is a case study with two subjects who met the inclusion criteria. The intervention was administered for 7 days, during which subjects consumed tomato juice and dragon fruit juice. Blood glucose levels were measured before and after the intervention using an Easy Touch device. Results: The study showed a decrease in blood glucose levels after administration of both juices. This indicates that the combination of tomato juice and dragon fruit juice can significantly lower blood glucose levels. Conclusion: Administering tomato juice and dragon fruit juice can be an effective complementary therapy in lowering blood glucose levels in patients with type 2 diabetes mellitus.

Keywords: Type 2 Diabetes Mellitus, Tomato Juice, Dragon Fruit Juice, Blood Glucose, Complementary Therapy Training.



Abstract

Background: Type 2 diabetes mellitus is a chronic metabolic disorder characterized by elevated blood glucose levels due to insulin resistance or impaired insulin secretion. One effort to help lower blood glucose levels is through complementary therapy using natural ingredients such as tomato juice and dragon fruit juice, which contain various active compounds such as lycopene, fiber, vitamin C, and antioxidants. **Objective:** To determine the effect of tomato juice and dragon fruit juice on 2-hour post prandial blood glucose levels in type 2 diabetes mellitus patients. **Methods:** This research is a case study with two subjects who met the inclusion criteria. The intervention was administered for 7 days, during which subjects consumed tomato juice and dragon fruit juice. Blood glucose levels were measured before and after the intervention using an Easy Touch device. **Results:** The study showed a decrease in blood glucose levels after administration of both juices. This indicates that the combination of tomato juice and dragon fruit juice can significantly lower blood glucose levels. **Conclusion:** Administering tomato juice and dragon fruit juice can be an effective complementary therapy in lowering blood glucose levels in patients with type 2 diabetes mellitus.

Keywords: Type 2 Diabetes Mellitus, Tomato Juice, Dragon Fruit Juice, Blood Glucose, Complementary Therapy Training.

1. INTRODUCTION

Diabetes mellitus is a chronic condition characterized by high blood sugar levels, which occurs due to impaired ability of the body to digest proteins, fats, and carbohydrates. One of the main features of diabetes mellitus is hyperglycemia or high blood sugar levels, which occurs due to insufficient insulin production, decreased insulin effectiveness, or a combination of both factors. When the body's insulin levels are inadequate, people with diabetes will experience increased blood sugar levels because their systems cannot use insulin efficiently or produce it. The body can experience negative consequences from hyperglycemia, which is generally defined as persistently high blood glucose levels (Dewi, 2024).

Every year, the incidence or prevalence of diabetes mellitus increases. According to the International Diabetes Federation (IDF), 424.9 million individuals worldwide suffer from diabetes mellitus. This number is predicted to rise to 628.6 million by 2045. With 10.3 million individuals suffering from diabetes mellitus, Indonesia ranks sixth highest in terms of the number of patients with this disease globally (Suprpto et al., 2024). In 2022, the International Diabetes Federation (IDF) reported that Indonesia has a high number of diabetes mellitus cases. This is evidenced by the fact that 463 million people worldwide suffer from diabetes, with a global prevalence of 9.3%. However, 50.1% of people with diabetes are undiagnosed, which is a serious condition. This shows how diabetes continues to affect the world as a silent killer. By 2045, the number of people with diabetes is predicted to increase by 45%, or 628.6 million people per year. Even more concerning, up to 75% of diabetes patients in 2020 were between the ages of 20 and 60 (Inslow, 2024).

According to the Central Java Health Profile, in 2020 there were 582,559 cases (13.67%), in 2021 there were 467,365 cases (11.0%), and in 2021 there were 163,751 cases (15.6%)



(Central Java Health Office, 2023). Based on data from the Central Java Basic Health Research, there were 2,444 cases of diabetes mellitus in Purbalingga Regency in 2019, making the total number of cases 91,161 nationally. The prevalence of diabetes mellitus increased by 13,117 in 2021, according to the latest information from the Purbalingga Regency Health Office (2019) (Central Java Provincial Health Office, 2019).

The highest incidence of diabetes is found in the elderly population, particularly those aged over 60 years. Data from patients in Kemangkong District showed 63 cases of diabetes mellitus in January 2025 (Kemangkong District Health Office, 2025).

There are two types of treatment for diabetes patients, namely pharmacological and non-pharmacological treatments. Insulin injections or antidiabetic medications are two pharmacological treatments for type 1 diabetes patients. The use of synthetic drugs is not the best way to avoid problems; these medications only lower blood glucose levels. Moreover, the development of synthetic drugs is ongoing due to their relatively high cost. Patients stop taking medication due to the many side effects of pharmacological treatment, making therapy ineffective. According to Latifah et al. (2024), kidney damage is one of the adverse effects of long-term medication use.

Since non-pharmacological treatment (phytopharmaceuticals) has no negative impact on health, it becomes the primary choice for lowering blood glucose levels. Such treatment is usually easy and inexpensive. Diabetes mellitus patients can be treated non-pharmacologically by regulating body weight, applying a balanced diet, changing lifestyle, maintaining physical fitness, managing stress, avoiding alcohol and cigarettes, and consuming herbal medications. This emphasizes that non-pharmacological treatment can be used as complementary therapy, particularly to accelerate recovery, in addition to being an alternative treatment. Alternatively, tomatoes are one of the non-pharmacological treatments that can be used as adjunctive therapy, particularly to accelerate healing. Diabetes mellitus can be treated with pharmacological and non-pharmacological methods. Insulin injections or oral hypoglycemic agents (OHAs) are two pharmacological options for managing diabetes. The primary non-pharmacological treatment for diabetes patients is diet; patients with diabetes are advised to consume high amounts of fiber and antioxidants to help prevent complications and manage their condition. Fruits such as oranges, dragon fruit, apples, and tomatoes are good sources of fiber and antioxidants (Yulyana & Ashar, 2024).

Dragon fruit contains several nutrients, including vitamins B1, B2, and B3, as well as protein and carbohydrates. It also contains antioxidants such as vitamin C, vitamin E, betalain, hydroxycinnamate, carotenoids (lycopene, beta-carotene), flavonoids, betacyanin, and betaxanthin. Due to its flavonoid content, which is an antioxidant that protects beta cells (which produce insulin) from damage and can increase insulin sensitivity, dragon fruit is believed to have a blood sugar-lowering effect (Kaffah et al., 2024).

Tomatoes are another effective non-pharmacological treatment for lowering blood sugar levels. Tomatoes are rich in vitamin K for bone health, vitamin C for immune system and cell regeneration, and vitamin A for eye health. Additionally, tomatoes contain lycopene, an antioxidant that can lower blood sugar and fight free radicals (Latifah et al., 2024).

A study conducted by Wayan et al. (2023) titled "The Effect of Tomato Juice and Dragon Fruit on Blood Sugar Levels in Diabetes Patients at the Peguyangan Kaja III Health Center" found that before consuming dragon fruit juice, the average blood sugar level was 181 ± 29.15 mg/dL; after consuming dragon fruit juice, the blood sugar level decreased to 162 ± 25.22 mg/dL (p -value = 0.003). Before consuming tomato juice, the average blood sugar level was



173 \pm 33.53 mg/dL; after consuming tomato juice, the blood sugar level decreased to 157 mg/dL \pm 22.34 mg/dL (p-value = 0.001). The blood sugar levels of diabetes patients in the Peguyangan Kaja area decreased after consuming tomato and dragon fruit juice.

Based on a preliminary survey conducted in Bakulan Village, six out of ten patients with type 2 diabetes mellitus reported that they had never tried tomatoes or dragon fruit as herbal blood sugar-lowering agents. They only knew tomatoes as a juice and were unaware of how to utilize them to lower blood sugar levels. Based on the background outlined above, the researcher is interested in investigating the "Effect of Tomato Juice and Dragon Fruit Juice on Reducing 2-Hour Postprandial Blood Glucose Levels in Type 2 Diabetes Patients in Bakulan Village, Kemangkon District".

2. RESEARCH METHOD

The procedure for collecting and evaluating information is a narrow definition of research design. Descriptive research will be the methodology used. The main goal of descriptive research is to provide an objective description of a scenario. In-depth analysis of a single research unit, whether it's a patient, family, group, community, or institution, is known as a research design. In this study, a single patient case is used to investigate a problem. The patient selected has undergone thorough analysis and aligns with the case, contributing risk factors, related incidents or actions, and the case's response to treatment.

3. RESULTS AND DISCUSSION

The assessment and time contract were conducted on June 26, 2025, at 07:30 WIB. This study involved two respondents, a 56-year-old woman (Ny. S) and a 62-year-old man (Tn. T), both elderly individuals with type II diabetes mellitus living in Bakulan Village, Kemangkon District, Purbalingga Regency. They received one glass of tomato and dragon fruit juice daily for 7 days, aiming to naturally lower blood glucose levels through a simple non-pharmacological method.

Table 4.1 Observation Results of Blood Glucose Levels Respondent 1 Tomato Juice

JUSTOMAT				
Hari	Tanggal	Sebelum Intervensi (mg/dL)	Sesudah Intervensi (mg/dL)	Besar Penurunan
1	26/6/2025	265 mg/dL	264 mg/dL	1 mg/dL
2	27/6/2025	260 mg/dL	255 mg/dL	5 mg/dL
3	28/6/2025	213 mg/dL	206 mg/dL	7 mg/dL
4	29/6/2025	239mg/dL	189 mg/dL	50 mg/dL
5	30/6/2025	400 mg/dL	265 mg/dL	135 mg/dL
6	1 /7/2025	232 mg/dL	216 mg/dL	16 mg/dL
7	2 /7/2025	305 mg/dL	264 mg/dL	41 mg/dL



Jumlah	255 mg/dL
Ratarata	219 mg/dL

Table 4.1 shows the results of daily blood glucose level measurements from June 26, 2025, to July 2, 2025, conducted once a day in the morning. Over time, there were fluctuations in blood glucose levels, with increases and decreases observed. Notably, there were increases before the administration of tomato juice on June 30, 2025, and July 2, 2025. On June 30, before the administration of tomato juice, the baseline glucose level was 400 mg/dL, and after the administration, it decreased to 265 mg/dL, with a significant decrease of 135 mg/dL. On July 2, before the administration of tomato juice, the glucose level was 305 mg/dL, and after the administration, it decreased to 264 mg/dL, with a decrease of 41 mg/dL. These data indicate fluctuations in blood glucose levels throughout the observation period.

Table 4.2 Observation Results of Blood Glucose Levels Respondent 2 Dragon Fruit Juice

JUS BUAH NAGA				
Hari	Tanggal	Sebelum Intervensi (mg/dL)	Sesudah Intervensi (mg/dL)	Besar Penurunan
1	26/6/2025	306 mg/dL	298 mg/dL	8 mg/dL
2	27/6/2025	243 mg/dL	196 mg/dL	47 mg/dL
3	28/6/2025	238 mg/dL	220 mg/dL	18 mg/dL
4	29/6/2025	320 mg/dL	277 mg/dL	43 mg/dL
5	30/6/2025	160 mg/dL	138 mg/dL	22 mg/dL
6	1 /7/2025	245 mg/dL	195 mg/dL	50 mg/dL
7	2 /7/2025	258 mg/dL	178 mg/dL	80 mg/dL
Jumlah				268 mg/dL
Rata-rata				199 mg/dL

Table 4.2 shows the results of daily blood glucose level measurements from June 26, 2025, to July 2, 2025, conducted once a day in the morning. Over time, there were fluctuations in blood glucose levels, with increases and decreases observed. Notably, there were increases before the administration of dragon fruit juice on June 26 and 29. On June 26, before the administration of dragon fruit juice, the baseline glucose level was 306 mg/dL, and after administration, it decreased to 298 mg/dL, with a decrease of 8 mg/dL. On June 29, before the administration of dragon fruit juice, the glucose level was 320 mg/dL, and after administration, it decreased to 277 mg/dL, with a decrease of 43 mg/dL. These data indicate fluctuations in blood glucose levels throughout the observation period.

Discussion

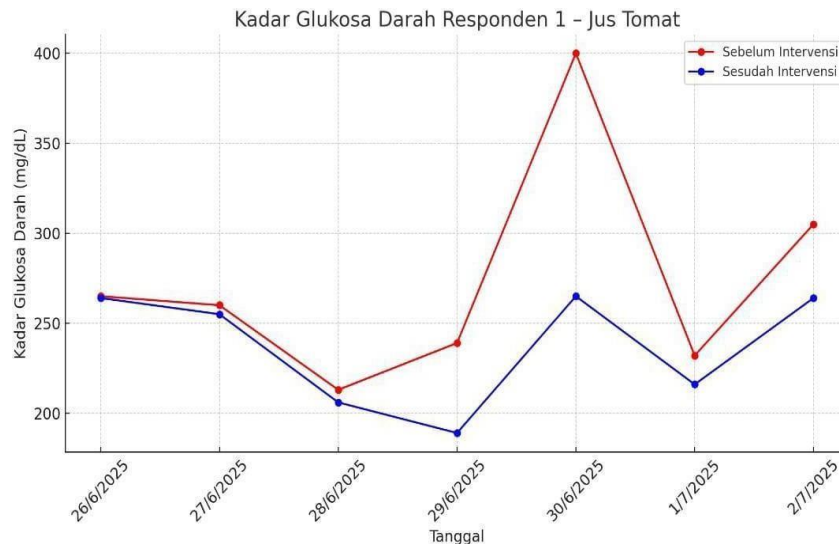


Figure 4.1 Graph of Decreased Blood Glucose Levels with Tomato Juice

Source: Personal Collection (2025)

This case study aims to determine the effect of tomato juice on decreasing blood glucose levels in patients with diabetes mellitus. Sampling, tomato juice administration, and time contracts were conducted on June 26, 2025, in the morning. The intervention was carried out for seven consecutive days, from June 26 to July 2, 2025, with administration once a day in the morning. Daily Blood Glucose Level Changes The graph shows changes in blood glucose levels (in mg/dL) daily. On the first day, a pre-test was conducted (June 26, 2025, at 07:00 WIB) to determine the initial blood glucose level before administering tomato juice. The value obtained was 265 mg/dL, indicating that the respondent had hyperglycemia. After 2 hours post-meal, tomato juice was administered, and the value obtained was 264 mg/dL, with a decrease of only 1 mg/dL. This result serves as a basis for evaluating the effectiveness of the intervention to be carried out for seven days.

Daily Progress Day 1 (June 26, 2025): Pre-test value was 265 mg/dL, and post-intervention value was 264 mg/dL, with a decrease of 1 mg/dL. Day 2 (June 27, 2025): Pre-intervention value was 260 mg/dL, and post-intervention value was 255 mg/dL, with a decrease of 5 mg/dL. Day 3 (June 28, 2025): Pre-intervention value was 213 mg/dL, and post-intervention value was 206 mg/dL, with a decrease of 7 mg/dL. Day 4 (June 29, 2025): Pre-intervention value was 239 mg/dL, and post-intervention value was 189 mg/dL, with a decrease of 50 mg/dL. The increase in blood glucose level was due to inconsistent eating habits and stress. Day 5 (June 30, 2025): Pre-intervention value was 400 mg/dL, and post-intervention value was 265 mg/dL, with a significant decrease of 135 mg/dL. Day 6 (July 1, 2025): Pre-intervention value was 232 mg/dL, and post-intervention value was 216 mg/dL, with a decrease of 16 mg/dL. Day 7 (July 2, 2025): Pre-intervention value was 305 mg/dL, and post-intervention value was 264 mg/dL, with a decrease of 41 mg/dL. The most significant decrease occurred on Day 5, with a blood glucose level decrease of 135 mg/dL.

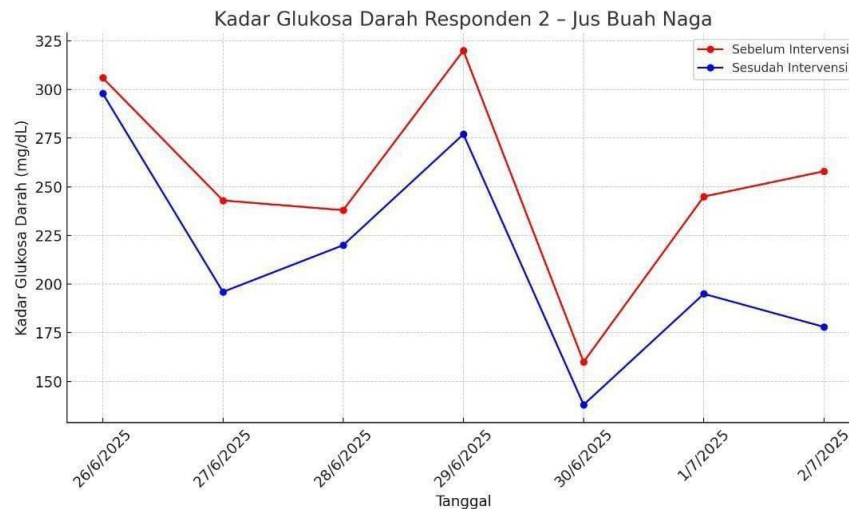


Figure 4.2 Graph of Decreased Blood Glucose Levels with Dragon Fruit Juice
Source: Personal Collection (2025)

This case study aims to determine the effect of dragon fruit juice on decreasing blood glucose levels in patients with diabetes mellitus. Sampling, dragon fruit juice administration, and time contracts were conducted on June 26, 2025, in the morning. The intervention was carried out for seven consecutive days, from June 26 to July 2, 2025, with administration once a day in the morning. Daily Blood Glucose Level Changes The graph shows changes in blood glucose levels (in mg/dL) daily. On the first day, a pre-test was conducted (June 26, 2025, at 08:00 WIB) to determine the initial blood glucose level before administering dragon fruit juice. The value obtained was 306 mg/dL, indicating that the respondent had hyperglycemia. After 2 hours post-meal, dragon fruit juice was administered, and the value obtained was 298 mg/dL, with a decrease of only 8 mg/dL. This result serves as a basis for evaluating the effectiveness of the intervention to be carried out for seven days. Daily Progress Day 1 (June 26, 2025): Pre-test value was 306 mg/dL, and post-intervention value was 298 mg/dL, with a decrease of 8 mg/dL. Day 2 (June 27, 2025): Pre-intervention value was 243 mg/dL, and post-intervention value was 196 mg/dL, with a decrease of 47 mg/dL. Day 3 (June 28, 2025): Pre-intervention value was 238 mg/dL, and post-intervention value was 220 mg/dL, with a decrease of 18 mg/dL. Day 4 (June 29, 2025): Pre-intervention value was 320 mg/dL, and post-intervention value was 277 mg/dL, with a decrease of 43 mg/dL. The increase in blood glucose level was due to inconsistent eating habits and stress. Day 5 (June 30, 2025): Pre-intervention value was 160 mg/dL, and post-intervention value was 138 mg/dL, with a decrease of 22 mg/dL. Day 6 (July 1, 2025): Pre-intervention value was 245 mg/dL, and post-intervention value was 195 mg/dL, with a decrease of 50 mg/dL. Day 7 (July 2, 2025): Pre-intervention value was 258 mg/dL, and post-intervention value was 178 mg/dL, with a decrease of 80 mg/dL.

The most significant decrease occurred on Day 7, with a blood glucose level decrease of 80 mg/dL. This study shows that consuming dragon fruit juice daily can help lower blood glucose levels in patients with diabetes mellitus. The effect is attributed to the active compounds such as lycopene, fiber, and flavonoids in dragon fruit juice, which help reduce



blood glucose levels. Therefore, dragon fruit juice can be used as a non-pharmacological supportive therapy for patients with diabetes mellitus.

4. CONCLUSION

Based on the results of a 7-day case study conducted on two patients with diabetes mellitus in Bakulan Village, it can be concluded that:

1. Regular consumption of tomato juice and dragon fruit juice once a day for 7 days can lower blood glucose levels. Tomato juice was able to lower blood glucose levels from 400 mg/dL to 265 mg/dL, while dragon fruit juice lowered blood glucose levels from 320 mg/dL to 277 mg/dL. According to the researcher, dragon fruit juice is more effective in lowering blood glucose levels due to its high water content (87.3 grams) compared to tomato juice (94 mg).
2. The measurement results of blood glucose levels before intervention showed that the respondents were in a state of hyperglycemia with results of 265 mg/dL and 306 mg/dL.
3. Documentation of tomato juice and dragon fruit juice administration showed that the administration was carried out consistently once a day.

Thus, this case study successfully achieved its general objective, which was to identify the effect of tomato juice and the effects of dragon fruit juice on reducing blood glucose levels, and met the specific objectives of measuring blood glucose levels before and after intervention and documenting the intervention process systematically.

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