



## **THE EFFECTIVENESS OF AVOCADO LEAF DECOCTION ON REDUCING BLOOD SUGAR LEVELS IN PATIENTS WITH TYPE 2 DIABETES**

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### **ABSTRACT**

DM is one of the non-communicable diseases that causes the highest mortality in the world and reduces the quality of life of sufferers due to complications of the disease. Currently, the majority of DM treatments use synthetic materials that have side effects on sufferers so that the sentiment of 'returning to nature' is an alternative choice for DM sufferers using traditional medicinal plants. The purpose of this study was to determine the effectiveness of avocado leaf decoction in reducing blood sugar levels in type 2 DM patients. The type of research used is quasi experiment with pre-test and post-test without control group design. The population in this study were all patients with type 2 diabetes mellitus at the Meni Laot Health Center in Sabang City, totaling 140 people. The sample in this study were 58 patients with type 2 diabetes with sampling technique. Data collection was carried out using instruments in the form of GCU tools (to measure KGD), measuring tape / metline (to measure upper arm circumference / ILLA) and questionnaires (to obtain primary data in the form of name, age, gender, and occupation). Boil the avocado leaves with 1 1/2 - 2 cups of water for 10 minutes or until the water is reduced by half by heating 200 ml of water in a saucepan, then after the water boils add 4-5 washed avocado leaves. Strain the boiled water, then wait until it cools. Research data analysis is univariate and bivariate analysis with the Wilcoxon rank test. The results showed that avocado leaf decoction was ineffective in reducing blood sugar levels in patients with type 2 diabetes ( $p = 0.036$ ). The conclusion of this study is that avocado leaf decoction is ineffective in reducing blood sugar levels in patients with type 2 diabetes. I

Keywords: avocado leaves; blood sugar levels; decoction; diabetes mellitus introduction

### **INTRODUCTION**

Diabetes Mellitus (DM) is a disease commonly called diabetes. It is said to be DM if the blood sugar level (KGD) exceeds normal because the fruit no longer has insulin or insulin cannot work properly (Tandra, 2023). DM is a complex chronic disease and requires ongoing medical care with multi-factor risk reduction strategies beyond glycemic control. (Marasabessy et al., 2020). The diagnosis of DM cannot be made just by looking at the symptoms that arise, but DM symptoms can be used as a warning alarm (Medika, 2022). DM is one of the non-communicable diseases that is the leading cause of death in the world and reduced quality of life of patients due to complications of the disease. DM is divided into 2 categories, namely type 1 and type 2 DM. Type 1 DM is usually experienced since childhood. While type 2 DM is mostly experienced by adults (Nusdin, 2022). Type 2 DM is a lifelong disease and has insulin resistance. This is the most common type of DM (Saimi & Satriyadi, 2024).

According to WHO in 2013, it is estimated that the number of DM will increase threefold from 2000 to 2030 worldwide. According to the American Diabetes Association (ADA) (2013), of the 25.8 million Americans, 8.3% are diagnosed with DM each year. More than 80% of deaths due to DM occur in poor and developing countries (Parliani et al., 2021). According to the 10th edition of the Diabetes Atlas in 2021 and the International Diabetes Federation (IDF), it is estimated that out of 220 countries worldwide, there are 537 million people with diabetes, and

this figure will reach 643 million in 2030, and 783 million in 2045 (Tandra, 2023). Indonesia ranks sixth in the world for the highest prevalence of diabetes sufferers in the world along with China, India, the United States, Brazil, and Mexico with an estimated number of diabetes sufferers of 10 million people. The population of Asia includes China, India, Japan, Korea. Vietnam, Pakistan, and Indonesia are groups that are susceptible to DM. In 1995, Indonesia was ranked seventh as the country with the largest number of DM sufferers in the world (4.5 million people), in 2025, Indonesia is estimated to rise to fifth place (12.4 million people) (Tandra, 2023).

In Indonesia, DM is the 3rd largest cause of death (6.7%) after stroke (21.1%) and heart disease (12.9%) (Saimi & Satriyadi, 2024). In the 10th edition of the IDF Atlas, it is stated that in Indonesia, the estimated adult population of diabetes aged 20-79 years is 19,465,100 people. Meanwhile, the total adult population aged 20-79 years is 179,720,500, so that when calculated from these two figures, the prevalence of diabetes in the age group between 20-79 years is 10.6%. In other words, if calculated in the 20-79 year age group, this means that 1 out of 9 people have diabetes (Ministry of Health, 2022). Currently, the majority of DM treatments use synthetic ingredients that have side effects on sufferers, so the sentiment of 'returning to nature' becomes an alternative choice for DM sufferers by using traditional medicinal plants. Medicinal plants have advantages in treating DM because they have a constructive function. Avocado plant (*Persea americana*) is a native tree of America and can be used in traditional medicine to treat various diseases such as hypertension, stomach ache, diabetes, bronchitis and diarrhea. Fresh avocado leaves can be consumed in the form of water infusion or brew/decoction for various diseases. Avocado leaves contain persimmon which is toxic to livestock that are breastfeeding. This avocado plant can also treat the body with symptoms of weakness. This herb from the leaves of this plant is most widely used by boiling/brewing it in water and then being consumed by people suffering from DM (Hasan et al., 2022).

Research conducted by Hapsari et al. (2018) on the effect of giving boiled water of avocado seeds and pandan leaves on decreasing blood sugar levels in Type II DM patients at Panarung Health Center and Bukit Hindu found that there was an effect of giving boiled water of avocado seeds and pandan leaves. The conclusion is that there is an effect of giving boiled water of avocado seeds and pandan leaves on decreasing blood sugar levels in Type II DM patients ( $p = 0.000$ ) (Hapsari et al., 2018). Another study conducted by Lesly et al. (2021) on the Test of the Effectiveness of Giving Boiled Water from Avocado Leaves (*Persea americana* Mill) on Blood Glucose Levels in White Rats (*Rattus inorvegicus*) Induced by Alloxan found that boiled water from avocado leaves was effective in reducing blood sugar levels in rats that were given alloxan induction with the best concentration, namely 800 mg/kgBW, accompanied by a percentage of blood sugar levels that decreased by 63.80% (Lesly et al., 2021). Based on an initial survey conducted on October 10, 2024 at the Pria Laot Health Center, Sabang City, data on outpatient visits for DM patients from January to September were obtained as many as 410 people, with an average of 46 people per month for outpatient type 2 DM cases and 45 inpatients. Data on type 2 DM patients in the last 3 months were 140 people, both outpatients and inpatient. The aim of this study was to determine the effectiveness of avocado leaf decoction in reducing blood sugar levels in type 2 DM patients. at the Pria Laot Health Center, Sabang City in 2024"

## **METHOD**

This type of research uses a quasi-experimental research design with a pre- and post-test design without a control group. This research was conducted at the Pria Laot Health Center in Sabang City. The population of this study was all type 2 DM patients at the Pria Laot Health Center in Sabang City totaling 140 people. The sample in this study was 58 type 2 DM patients with a sampling technique in this study using purposive sampling with inclusion criteria being type 2 DM patients without severe complications (eg, infarction DM) who were willing to be treated,

aged > 50 years and who were not currently consuming herbal therapy. Data collection was carried out using instruments in the form of a GCU tool (to measure KGD), a measuring tape/metline (to measure upper arm circumference/LLA) and a questionnaire (to obtain primary data in the form of name, age, sex type, ID and occupation). Boil the avocado leaves with 1/2 glass of water for 10 minutes or until the water is reduced by half by heating 200 ml of water in a saucepan, then after the water boils, add 4-5 pieces of avocado leaves which have been washed clean. iStrain the boiled water, then wait until it cools. The data analysis technique used is the Wilcoxon Rankine test with a degree of significance ( $\alpha = 15\%$ ). This research has passed the ethics test with number 011/KEPK/UNPRI/XI/2024.

## RESULTS

### Univariate Analysis

#### Decrease in Blood Sugar Levels in Type 2 DM Patients Before Being Given Avocado Leaf Decoction

Table 1.  
 Distribution of Frequency of Decrease in Blood Sugar Levels in Type 2 DM Patients Before Being Given Avocado Leaf Decoction

Blood Sugar Level	f	%
≤ 140 mg/dl	19	32,8
> 140 mg/dl	39	67,2
Total	58	100

Based on Table 1, it can be seen that the blood sugar levels of type 2 DM patients before being given avocado leaf decoction showed that the majority of respondents' blood sugar levels were > 140 mg/dl, as many as 39 people (67.2%) and the minority of respondents' blood sugar levels were ≤ 140 mg/dl, as many as 19 people (32.8%).

Table 2.  
 Distribution of Frequency of Decrease in Blood Sugar Levels in Type 2 DM Patients After Being Given Avocado Leaf Decoction

Kadar Gula Darah	f	%
≤ 140 mg/dl	30	51,7
> 140 mg/dl	28	48,3
Total	58	100

Based on Table 2, it can be seen that the blood sugar level data of type 2 DM patients after being given boiled avocado leaves shows that the majority of respondents' blood sugar levels were ≤ 140 mg/dl, as many as 30 people (51.7%) and the minority of respondents' blood sugar levels were > 140 mg/dl, as many as 28 people (48.3%).levels were ≤ 140 mg/dl, as many as 30 people (51.7%) and the minority of respondents' blood

### Bivariate Analysis

Table 3.  
 Normality Tes

Variabel	Kolmogorov-Smirnov Statistics	Significance (p-value)	Description
Blood Sugar Levels	0,151	0,003	Data is not normally distributed

Based on the data normality test, it was found that the p value was 0.003 ( $p < 0.05$ ), so it can be concluded that the data is not normally distributed. So the researcher continued by using the Wilcoxon test.

## The effectiveness of avocado leaf decoction on reducing blood sugar levels in type 2 DM patients

Table 4.

The effectiveness of avocado leaf decoction on reducing blood sugar levels in type 2 DM patients at the Pria Laot Health Center, Sabang City in 2024

Variabel	Average before (Pre test)	Average is finished (Post test)	Z	P
Blood Sugar Levels	14	14	-1.968	0,036

Based on the results of the Wilcoxon test, a p-value of 0.036 was obtained, which means that the p-value  $> \alpha$  (0.05), so it can be concluded that avocado leaf decoction is effective in reducing blood sugar levels in type 2 DM patients at the Pria Laot Health Center, Sabang City in 2024.

### DISCUSSION

The results of the study explained that before being given avocado leaf decoction, it was found that the majority of respondents' blood sugar levels were abnormal, as many as 39 people (67.2%) and the minority of respondents' blood sugar levels were normal, as many as 19 people (32.8%). After being given avocado leaf decoction, it was found that the majority of respondents' blood sugar levels were normal, as many as 30 people (51.7%) and the minority of respondents' blood sugar levels were abnormal, as many as 28 people (48.3%). Based on the Wilcoxon results, it was found that avocado leaf decoction was effective in reducing blood sugar levels in type 2 DM patients at the Pria Laot Health Center, Sabang City in 2024. The results of this study are in line with the research of Lesy ddk (2021) which found that boiled avocado leaf water has the effectiveness of reducing blood sugar levels in mice given local induction with the best concentration of 800 mg/kg BW accompanied by a percentage of blood sugar levels that decreased by 63.80%. This states that boiled avocado leaf water can reduce blood sugar levels in DM sufferers. Avocado leaves (*Persea americana*) have long been used in traditional medicine for a variety of health benefits, including lowering blood sugar levels. The content of active compounds in avocado leaves such as flavonoids, saponins, tannins, and alkaloids is believed to have hypoglycemic potential. Flavonoids in avocado leaves have antioxidant properties that can help increase insulin sensitivity and reduce insulin resistance, thereby lowering blood sugar levels (Hidayat & Napitupulu, 2015).

**This study is also in line with Ulan et al. (2022) who found that the results of 70% avocado leaf ketanol extract (*Persea americana* Mill) have activity in lowering blood glucose levels.**

Avocado leaf ketanol extract at a dose of 175 mg/kg BW with an average decrease in blood sugar levels of 45 mg/dl is the most effective dose in lowering blood glucose levels in induced male mice. 70% avocado leaf ethanol extract (*Persea americana* Mill) contains secondary metabolites of alkaloids, flavonoids, saponins and tannins which can lower blood glucose levels (Rohenti, 2023). Diabetes molus is a chronic metabolic disease characterized by hyperglycemia. This condition is often accompanied by sleep disturbances resulting in neuropathy, nocturia, and anxiety. Sleep disturbances can worsen glycemic control, forming a vicious circle that is detrimental (Wahyuni, 2020). Antioxidants in avocado leaves help protect pancreatic beta cells from oxidative damage, which is important in maintaining insulin production. Tannins and saponins help increase glucose metabolism in the body, so that blood sugar is more controlled (Perwita et al., 2022). According to the researcher's assumption, avocado leaf decoction has the potential to be a natural solution to lower blood sugar levels, but it must be used wisely and according to recommendations. Further research is needed to ensure the safety and optimal dosage of its use.

## CONCLUSION

The majority of respondents' blood sugar levels were  $> 140$  mg/dl as many as 39 people (67.2%), The majority of respondents' blood sugar levels were  $\leq 140$  mg/dl as many as 30 people (51.7%), Avocado leaf decoction is effective in reducing blood sugar levels in type 2 DM patients at the Laot Men's Health Center, Sabang City in 2024 i

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