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The Effectiveness Of Anredera Cordifolia On Blood Sugar Levels Of People With Diabetes Mellitus Type 2

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ABSTRACT

The main problem for type 2 diabetes mellitus is blood glucose instability. This study aimed to determine the effect of binahong leaf decoction in reducing blood sugar levels in patients with type 2 diabetes. Leaf boiled water has made from 100 grams of fresh binahong leaves boiled in 400 ml until the remaining 200 ml. Respondents drank boiled water from binahong leaves two times a day for one week. The tool measured blood sugar levels using a glucometer with the Strip method. Statistical data analysis was carried out using statistical tests, namely Paired T-test with = < 0.05. Binahong leaf decoction reduced blood sugar levels for seven days of consumption. The average decrease in blood glucose is about 33 Mg/dl. Binahong leaves (Anredera cordifolia) can reduce blood glucose levels in patients with type 2 DM because they contain saponins, alkaloids, polyphenols, flavonoids and mono polysaccharides which have insulin-like activity, can inhibit lipolysis, increase glucose uptake by adipose cells so that it can improve insulin resistance Boiled fresh binahong leaves with an adjusted amount based on body weight. It tested on human subjects Optimal dose of binahong leaf ethanolic extract, which has an antidiabetic effect because saponin compounds are also resistant to heating, so they will not be damaged when boiled on binahong leaves binahong leaves do not show signs of toxic abnormalities, so they are considered safe for medical use.

Keyword : binahong, Anredera cordifolia, diabetes mellitus

Introduction

Diabetes mellitus (DM) is a metabolic disease that occurs due to damage to insulin secretion and insulin action, which can be characterized by hyperglycemia. Based on the etiology there are two types of DM, namely, type 1 DM and type 2 DM. Type 1 DM or Insulin Dependent Diabetes Mellitus (IDDM) is caused by an autoimmune disease. Autoimmune damage can cause cells located in the islets of Langerhans in the pancreas to be unable to secrete insulin again. While type 2 DM or Non-Insulin Dependent Diabetes Mellitus (NIDDM) is DM caused by insulin resistance, and usually, only relative (not absolute) insulin deficiency occurs initially (Daryabor et al., 2020).

In 2021, as many as 537 million people suffer from type II diabetes and it is predicted that this will increase to 643 million in 2030 and 783 million in 2045. Every 1-5 seconds, there are 6.7 million deaths due to type II diabetes worldwide. As many as 541 million people worldwide suffer from impaired glucose tolerance, and they will be at high risk of suffering from type 2 diabetes and costing health around 966 billion USD (IDF, 2020; Mustamu et al., 2020).

In Indonesia, there are 6.2% or about 10.8 million people suffering from type 2 DM in 2020. The age most suffering from this disease is the age of 55 to 65 years (Indonesian Ministry of Health, 2020)

A study showed that Diabetes Mellitus is a risk factor for coronary heart disease. Other studies say that women with type 2 diabetes are 5-7 times more likely to have a higher death rate through the opening of the heart's blood (Al-Nozha et al., 2016). The incidence, prevalence, and complications of DM are not commensurate with the importance of preventing and managing the disease. DM management is very effective in the early stages before symptoms or prediabetes appear. Prediabetes is characterized by fasting blood glucose levels between 100-125 mg/dL (Wang et al., 2021).

Risk factors for prediabetes include: Family history of diabetes, physical activity, age, gender, comorbidities, alcohol consumption, body mass index, smoking habits, drug consumption, and food intake are the main factors that have a significant effect in lowering blood glucose levels (Beulens et al., 2019; Hu et al., 2019). One of the plants that survive with improved prediabetes conditions through lowering blood glucose levels is binahong.

Binahong plant or commonly called (Anredera cordifolia) is a vine that is easy to grow in Indonesia, has the characteristics of having a small stem, has a strong rhizome, and has leaves that are not so big. Binahong leaves are more effective than stems and roots to serve as the main ingredient in lowering glucose levels because they can be obtained in large quantities and do not affect the plant's life (Haresmita et al., 2019). Binahong leaves contain saponins, alkaloids, polyphenols, flavonoids, and mono polysaccharides. From 20 grams of binahong leaf samples, the total triterpenoid saponins and steroids were approximately (28.14 ± 0.22) (Susanti, 2019).

Triterpenoids are water-soluble compounds, while steroid compounds are fat-soluble. Saponin compounds can lower blood glucose levels. Saponins are natural glycosides that use steroids or triterpenes (Wold et al., 2020).

Saponins have insulin-like activity, inhibit lipolysis, increase glucose uptake by adipose cells. A study shows that saponin compounds can improve insulin resistance. Saponin compounds are also resistant to heating to not be damaged when boiling the binahong leaves. The solubility of saponin compounds in water at a temperature of 300 C is 7.4 grams/100 mL and will increase at a temperature of 18.0 grams/100 mL at 700C (Hasbullah, 2016). Another study also proved an increase in the bioavailability of saponins in beverages that were boiled at a temperature of 700C to 100C with an immersion time of 1 to 7 minutes which was carried out with cat whiskers leaves. As a result, the drink that has the best physicochemical characteristics is the one that was boiled at 80C for 3 minutes (Astuti et al., 2011).

The experiments carried out to reach temperatures up to 800C can be reached using a time of ± 4 minutes using medium heat. The characteristics of the results of boiling are that before the water boils but already emits steam, with the aim that other active compounds are not damaged by heating to too high a temperature. Boiling binahong leaves is done to reduce the sap content and bitter taste in binahong leaves and make the colour of the leaves brighter so that they are more attractive to the public. This research was conducted by giving binahong leaf decoction as much as 155 grams / 70 kg body weight with a duration of administration of 14 days in humans (Tjahjani&Yusniawati, 2017).

Research on consuming binahong leaves on reducing blood glucose levels in humans has never been done. Research on mice given binahong leaf extract orally as much as 50, 100, and 200 mg/kg bb for 14 days showed that binahong leaf extract could reduce blood glucose levels in monitoring glucose levels on days 1, 7, and 14. On the other hand, Wistar rats were given binahong leaf extract at a dose of 1.8 grams/kg BW also showed a decrease in blood glucose levels in Wistar rats. From several types of binahong leaf extract, doses given to Wistar rats did not provide a significant difference in decreasing blood glucose levels (Rimporok, 2015).

Method

The type of research used is a pre-experimental study with Pre and Post-test Only One Group Design on 30 patients with type 2 diabetes who live in the working area of the Mariat Health Center, Sorong Regency. The sample size in this study was determined using Cohen's d table, one sample design for experiments with power settings 0.80 and effect size 0.80 where 0.05, then obtained a large sample of 33 people. Researchers also anticipate that if respondents drop out of the research sample, the correct formulation for the number of samples is 30 people. Leaf boiled water has made from 100 grams of fresh binahong leaves boiled in 400 ml until the remaining 200 ml of water. The water is filtered and then drunk. Respondents drank boiled water from binahong leaves two times a day for one week. The tool measured blood sugar levels using a glucometer with the Strip method. A glucometer is a portable device that can measure blood sugar levels, where the results can be known in about 11 seconds. To measure blood sugar levels with this tool, only 4 microliter blood samples are needed, where the glucometer will display the results of blood sugar levels. Statistical data analysis was carried out using statistical tests, namely Paired T-test with = < 0.05 and CI 95 because the data were normally distributed P = 0.273 (Shapiro-Wilk).

Results

A total of 30 respondents contributed to this study. The average age of the respondents in this study was 54.1 years which was dominated by women (66.7%) with elementary school education (60%). Most of the respondents work as farmers (50%). The average respondent suffered from DM for 14.6 years with an average blood glucose level of 199 mg/dl. The data is presented in Table 1

Table 1. Characteristics of respondents

Variable	f
Age, mean (SD)	54.1(12.1)
Gender	
Man	33.3
Woman	66.7
Education (%)	
primary school	60
junior high school	10
senior High School	30
Occupation	
civil servant	3.3
Farmer	50
Private	16.7
Not working	30
DM history, mean (SD)	14.6(3.69)
Blood glucose, mean (SD)	
Pre test	199 (62.8)
Post test	166 (3.69)

Table 2. Analysis of the effect of binahong leaf decoction on blood sugar in type 2 DM patients

Variable	N	Mean	median	SD	SE	p	Mean difference	SE difference
Pre test	30	199	178	62.8	11.5	<0.001	33.0	8.66
Post test	30	166	146	55.6	10.2			

Based on table 2 above, it was found that binahong leaf decoction reduced blood sugar levels for seven days of consumption. The average decrease in blood glucose is about 33 Mg/dl..

Discussion

Glucose/blood sugar is the simplest form of carbohydrate that is absorbed into the blood through the digestive system. Blood glucose levels rise after meals and fall to their lowest levels on the days before meals. Type II DM is a multifactorial disease with genetic and environmental components that are equally strong in the onset of the disease (Beulens et al., 2019).

Genetic factors influence is seen in the high number of people with diabetes who come from parents who have a previous history of DM. Type II diabetes is also called lifestyle diabetes because the causes other than heredity, environmental factors include age, obesity, insulin resistance, food, physical activity, and unhealthy lifestyles of patients who also play a role in the occurrence of this diabetes. II, namely unchangeable risk factors/risk factors that cannot be changed and changeable risk factors/factors that can be changed. The unchangeable risk factors consist of genetic disorders and age, and then the changeable risk factors consist of a bad diet, obesity, smoking, hypertension, lack of physical activity, and stress (Goyal &Jialal, 2021).

Chronic stress makes a person look for sweet and high-fat foods to increase brain serotonin levels, where serotonin has a temporary sedative effect to relieve stress, but glucose and fat content increase the risk of diabetes mellitus. Several previous studies have found that stress can increase the hormone adrenaline, which can convert glycogen reserves in the liver into glucose, increase blood sugar in DM patients, and prevent diabetes complications. Stress can also increase appetite and make people hungry, especially on foods rich in carbohydrates and fats (Kyrou et al., 2020).

Patients with type II diabetes who have low activity can also factor in uncontrolled fasting blood sugar levels. Low physical activity is an independent risk factor for chronic disease and is estimated to cause death globally. Uncontrolled fasting blood sugar levels can lead to several risks of diseases such as hypertension, coronary heart disease, and kidney failure (Mambiya et al., 2019).

One therapy that can be done is by consuming a decoction of binahong leaves, which is an intervention that can be done in DM patients. Binahong plant or commonly called (Anredera cordifolia)

is a vine that is easy to grow in Indonesia, has the characteristics of having a small stem, has a strong rhizome, and has leaves that are not so large. Binahong leaves are more effective than stems and roots to serve as the main ingredient in lowering glucose levels because they can be obtained in large quantities and do not affect the plant's life (Dwitiyanti et al., 2021).

Binahong leaves contain saponins, alkaloids, polyphenols, flavonoids, and mono polysaccharides. From 20 grams of binahong leaf samples, the total of triterpenoid saponins and steroids was approximately (28.14 ± 0.22). Triterpenoids are water-soluble compounds, while steroid compounds are fat-soluble. Saponin compounds can lower blood glucose levels. Saponins are natural glycosides bound to steroids or triterpenes (Dwitiyanti et al., 2021).

Saponins have insulin-like activity, inhibit lipolysis, increase glucose uptake by adipose cells. A study shows that saponin compounds can improve insulin resistance. Saponin compounds are also resistant to heating, so they will not be damaged when boiled on binahong leaves (Kintoko et al., 2017).

Several previous studies found that the decrease in blood sugar levels was related to the active component of saponin compounds from binahong leaves. Saponins have insulin-like activity, inhibit lipolysis, and increase glucose uptake by adipose cells. Consumption of 1.8 g/kg BW of binahong leaf extract can reduce fasting blood sugar levels. The mechanism of insulin action can also inhibit the activity of the alpha-glucosidase enzyme (the enzyme responsible for converting carbohydrates into glucose) (Latuhihin et al., 2020; Rohma et al., 2015).

The form of intervention in this study used fresh binahong leaves, which were boiled in an adjusted amount based on body weight and tested on human subjects. Decrease in blood sugar levels in mice. This shows that different forms of intervention may positively reduce blood sugar levels due to saponins that can inhibit alpha-glucosidase enzyme activity, inhibit lipolysis, and increase glucose uptake by adipose cells (Feriyani et al., 2021).

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The optimal dose of ethanol extract of binahong leaves with an antidiabetic effect is 50 mg/kg BW. However, several other studies state that the optimal dose is 155g/70kg BW. The active ingredients in binahong leaves, which are strongly suspected of helping lower blood sugar levels include saponins, flavonoids, steroids/triterpenoids, and coumarins. Triterpenoid compounds are water-soluble compounds, while steroid compounds are fat-soluble (Wijayanti et al., 2017).

Saponin compounds can lower blood glucose levels. Saponins are naturally occurring glycosides bound to steroids or triterpenes. Saponins have insulin-like activity, inhibit lipolysis, increase glucose uptake by adipose cells. A study shows that saponin compounds can increase insulin resistance. Saponin compounds are also resistant to heating, so they will not be damaged when boiled on binahong leaves (Singh et al., 2021).

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In addition to flavonoids, other binahong leaves contain alkaloids. Alkaloids have the ability to an antibacterial. The suspected mechanism is by interfering with the peptidoglycan constituent components in bacterial cells so that the cell wall layer is not fully formed and causes cell death. induce insulin secretion and improve insulin function. Binahong leaves have -amylase and Dipeptidyl peptidase IV inhibitory activities. The safety of using processed binahong leaves in controlling blood sugar levels has been researched and declared safe. It has been proven that the results of acute and sub-chronic studies of ethanol extract of binahong leaves show no signs of toxic abnormalities, so it is considered safe for medical use.

Conclusion

Binahong leaves ((Anredera cordifolia) can reduce blood glucose levels in patients with type 2 DM because they contain saponins, alkaloids, polyphenols, flavonoids and mono polysaccharides which have insulin-like activity, can inhibit lipolysis, increase glucose uptake by adipose cells so that it can improve

insulin resistance Boiled fresh binahong leaves with an adjusted amount based on body weight and tested on human subjects Optimal dose of binahong leaf ethanolic extract which has an antidiabetic effect because saponin compounds are also resistant to heating so they will not be damaged when boiled on binahong leaves binahong leaves do not show signs of toxic abnormalities, so they are considered safe for medical use

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