

Application of Cinnamon Bark Boiling to Reduce Blood Sugar Levels in Patients Type 2 Diabetes Mellitus

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ABSTRACT

Type II Diabetes Mellitus is a chronic disease characterized by an increase in blood sugar levels at times equal to or more than 200 mg/dL, and fasting blood sugar levels above or equal to 126 mg/dl. Diabetes Mellitus as a non-communicable disease is the number one cause of death in the world. It is estimated that 422 million adults lived with diabetes mellitus in 2014. Based on the 2018 Riskesdas results, the prevalence of type 2 DM based on doctor's diagnosis in Indonesia was 2.0%, whereas in 2013 it was only 1.5%. The aim of this research is the application of cinnamon bark decoction to reduce blood sugar levels in diabetes mellitus sufferers. This research was conducted in the working area of the Lubuk Basung Community Health Center with a Quasi-Experimental research type with the research design being a one group pretest-posttest design. This research was conducted for 3 days on all clients suffering from Diabetes Mellitus who met the inclusion criteria. The research results showed that the average pretest blood sugar with cinnamon bark decoction in respondents was 215.88 mg/dL. The posttest blood sugar results for respondents with cinnamon bark were 163.38 mg/dL. The difference in reducing blood sugar levels in respondents with cinnamon bark was 52.5 mg/dl. So it can be concluded that there is an influence on sugar levels in diabetes mellitus patients by giving cinnamon decoction.

Keywords: Diabetes Mellitus, Blood Sugar Levels, Cinnamon Bark

INTRODUCTION

Diabetes mellitus (DM) is a disease chronic disease characterized by an increase in blood glucose levels at times equal to or more than 200 mg/dL, and fasting blood sugar levels above or equal to 126 mg/dl (Bhattat al, 2016). DM is known as the silent killer because DM sufferers are often unaware of their disease, and when they find out they are already suffering from complications. DM can attack almost all systems of the human body, from the skin to the heart, causing complications (Hestiana, 2017; Wigati, RAE, & Rukmi, DK 2021).



Data from the International Diabetes Federation (IDF) Atlas for 2021 states that Indonesia is ranked 5th with the largest number of diabetes sufferers in the world. This figure has almost doubled in just two years, compared to 2019 of 10.7 million. The number of diabetes attacks in Indonesia reached 18 million in 2020. At that time, the prevalence of these cases increased by 6.2 percent compared to 2019. (info datin, 2019)

Type 2 Diabetes Mellitus (T2DM) is a chronic disease characterized by high blood sugar levels due to insulin resistance or insufficient insulin production (American Diabetes Association, 2022). Managing blood glucose levels is critical in preventing complications related to T2DM, such as cardiovascular disease, neuropathy, and kidney damage (Sharma, Nazareth, & Petersen, 2016). While pharmaceutical treatments exist, many patients seek complementary and alternative therapies, including herbal remedies (Khan et al., 2003).

Cinnamon bark (*Cinnamomum* spp.) has been traditionally used in various cultures for its medicinal properties, especially for its potential to lower blood glucose levels (Mang et al., 2006). Scientific studies suggest that compounds in cinnamon may improve insulin sensitivity and enhance glucose metabolism (Cao, Polansky, & Anderson, 2007). Boiling cinnamon bark to prepare a decoction is a common method to extract these bioactive components.

This study explores the effectiveness of boiled cinnamon bark in reducing blood sugar levels in patients with T2DM, aiming to provide an accessible and natural adjunct treatment option.

The 2018 Riskesdas results show that the prevalence of Diabetes Mellitus in Indonesia based on doctor's diagnosis at age > 15 years in 2013 was 1.5%. However, the prevalence of Diabetes Mellitus according to blood sugar examination increased from 6.9% in 2013 to 8.5% in 2018. This figure shows that only 25% of Diabetes Mellitus sufferers know that they suffer from Diabetes Mellitus. (RI Ministry of Health. 2020).

According to the Indonesian Ministry of Health (2018) West Sumatra had a total prevalence of type II DM of 1.6% in 2018 (Ministry of Health of the Republic of Indonesia, 2018). According to data from the West Sumatra Provincial Health Service in 2018, the number of type II DM cases in West Sumatra in 2018 amounted to 44,280 cases, with the highest number of cases in the Padang City area amounting to 12,231 cases (Padang City Health Service, 2019).

Diabetes Mellitus is a group of metabolic diseases characterized by hyper glycemia that occurs due to abnormalities in insulin secretion, insulin action, or both. Common symptoms of Diabetes Mellitus are poly uria, poly phagia, poly dipsia. The classification of Diabetes Mellitus is Diabetes Mellitus Type 1, Diabetes Mellitus Type II, Diabetes Mellitus Gestational Type, and Diabetes Mellitus Other Types. The most common type of Diabetes Mellitus is Type II Diabetes Mellitus, where around 90-95% of people suffer from this disease (Chaidir, 2017). Type II DM is a group of metabolic diseases characterized by hyperglycemia that occurs due to abnormalities in insulin secretion and insulin action. Diabetes Mellitus 1 2 type II (Type II DM) has various risk factors ranging from lifestyle, physical activity and poor diet and tends to be difficult to control comprehensively so that the incidence of type II DM continues to increase (Lathifah, 2017; Simanjuntak & Simamora, 2020).

In Indonesia, natural medicines in the form of herbal medicine are widely used by people in everyday life. Jamu is a natural medicine native to Indonesia that has been used for generations by Indonesian people. The use of herbal medicine has increasingly developed since the Indonesian government launched the herbal medicine scientification program in 2010. The development of

herbal medicine through this program also gave birth to scientific herbal medicine which is herbal medicine resulting from research on herbal medicine scientification.

On the other hand, the use of a combination of herbal/traditional medicines with conventional medicines can actually be dangerous for users because of drug interactions that are still unknown. Interactions of herbal and conventional medicines can cause bad effects as reported by several studies which can cause coma and death. Hypoglycemic effects of herbal drug interactions among diabetes patients who also use conventional drugs (Rabai, M., Norman, S., Hassan, AS, Rashid, B., et al., (2018)

Research conducted by Perdani and Hasibuan found that cinnamon bark has side effects on the body, for example worsening liver function disorders, respiratory problems, mouth sores (canker sores) and low blood sugar. Therefore, consuming herbal concoctions should be in the appropriate dosage/4-5 grams a day and should not have complications, especially for the liver. (Perdani, MS, & Hasibuan, AK 2021)

Cinnamon bark contains active substances, namely polyphenols, including cinnamaldehyde which has an antihyperglycemic effect, cinnamaldehyde activity as a decrease in the grelin hormone which can directly increase insulin sensitivity. A long-term decrease in the grelin hormone triggers a decrease in plasma glucose levels in fasting conditions and during the OGTT (Oral Glucose Tolerant Test), with insulin levels remaining (Camacho et al, 2015). In addition, the main polyphenolic components in cinnamon include cinnamic acid and Ferulic acid, which is a flavonoid component, both have m-hydroxy and p-methoxy residues in the phenol ring structure, has significant activity on pancreatic function at a concentration of 1 μ M, this is due to increasing glucose uptake and slowing hepatic gluconeogenesis with no effect on pancreatic insulin output. Cinnamic acid has the same effect as cinnamaldehyde, namely that it can secrete insulin, increase glucokinase activity and glycogen levels, thereby suppressing gluconeogenesis and glycogenolysis that occur in the liver post-prandial through decreasing the activity of glucose phosphate and phosphoenolpyruvate carboxylase along with improving glycemic control (Howard and White, 2012; Suwanto, et, al, 2020).

Based on this background, researchers feel it is necessary to conduct research to see the effect on blood sugar of boiled bay leaves and cinnamon bark. However, there is still little research on the comparison of herbal ingredients, so the aim of this research is to see the comparison between boiled bay leaves and cinnamon bark on blood sugar levels in patients with type 2 diabetes mellitus at the Lubuk Basung health center so that it can help diabetes sufferers in determine herbal medicines and lower blood sugar levels to approach normal.

METHODS

The method used is case study research using a one group pretest posttest design. This case study was carried out for 3 days on all clients suffering from diabetes mellitus who met the inclusion criteria, namely respondents with diabetes mellitus, those with hyperglycemia and respondents with oral drug therapy. Cinnamon extract is given in the morning and evening before bed. The instruments used were the cinnamon extract implementation sheet, and the blood sugar results sheet before and after administering the cinnamon extract.



RESULTS

1. Pretest Distribution of Respondents Reducing Blood Sugar Levels in Diabetes Mellitus Patients by Administering Cinnamon Decoction

Based on research conducted for 3 days and the results of the pretest test of giving cinnamon to reduce blood sugar levels in diabetes mellitus patients can be explained in the table below.

Table 1. Pre-test Distribution of Respondents to Reduce Blood Sugar Levels in Diabetes Mellitus Patients by Administering Cinnamon Decoction

Variable	Mean	Standard Deviation	Min-max
Pre-testwith cinnamon decoction	215.88	35,434	176-277

Table 1 shows the results that the average decrease in sugar levels in diabetes mellitus patients before giving cinnamon decoction was 215.88 with a standard deviation of 25.434. The highest sugar level is 277 while the lowest is 176. A person is said to be suffering from diabetes mellitus if the blood glucose level is above 200 mg/dL. If people have been diagnosed with diabetes mellitus, they have previously experienced an increase in blood glucose levels above 200 mg/dL, but when they are diagnosed they will definitely receive therapy in the form of drugs to lower blood glucose levels.(Hestiana, 2018).

Table 1 shows that most of the respondents with a history of diabetes mellitus were aged 60 - 70 years. Patients' risk of developing glucose intolerance increases with age. Age >45 years should be screened for Diabetes Mellitus. This is caused by degenerative factors, namely a decrease in body function, especially the ability of β cells to produce insulin. Diabetes often appears after a person enters a vulnerable age, especially after the age of 45 in those who are overweight, so that their body is no longer sensitive to insulin.(Silvia Dwi Kusuma Sari, 2021).

2. Posttest Distribution of Respondents Reducing Blood Sugar Levels in Diabetes Mellitus Patients by Administering Cinnamon Decoction in the Lubuk Basung Health Center Working Area

Based on research conducted for 3 days and the results of the pretest test of giving cinnamon to reduce blood sugar levels in diabetes mellitus patients can be explained in the table below.

Table 2. Posttest Distribution of Respondents Reducing Blood Sugar Levels in Diabetes Mellitus Patients by Administering Cinnamon Decoction

Variable	Mean	Standard Deviation	Min-max
Post-testwith	163.38	32,867	121-211

cinnamon decoction			
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Table 2 shows the results that the average reduction in sugar levels in diabetes mellitus patients after giving cinnamon decoction was 163.38 with a standard deviation of 32.867. The highest sugar level was 211 while the lowest was 121.

The majority of patients with diabetes mellitus are women compared to men. This is closely related to activity where women do less physical activity compared to their diet. Based on previous research, many of the respondents at risk of high blood sugar levels were women because they are women. As women get older, they lose protective factors in their bodies, namely the hormones estrogen and progesterone, which play an important role in hormonal metabolism, including insulin, thereby causing an increase in blood glucose levels. (Irwansyah and Kasim, 2021)

3. Average Sugar Levels in Diabetes Mellitus Patients Before and After Administration of Cinnamon Decoction

The results of the test for differences in sugar levels in diabetes mellitus patients in the Lubuk Basung health center working area before and after administering cinnamon decoction are presented in table 3.

Table 3. Test Results for Different Sugar Levels in Diabetes Mellitus Patients in the Lubuk Basung Health Center Working Area Before and After Administering Cinnamon Decoction

Treatment	Mean	Standard Deviation (SD)	Standard error of the mean	95 % CI	P-value
Before and after administering cinnamon decoction	51,500	36,241	12,813	21,202 – 51,798	0.005

The results of the analysis of sugar levels regarding the differences before and after giving cinnamon decoction based on table 4.8 show a p value (0.005) of $0.000 < 0.05$, so that H_0 is rejected and H_a is accepted. This means that there is a difference in sugar levels in diabetes mellitus patients in the Lubuk Basung health center working area before and after giving cinnamon decoction. The average sugar level in diabetes mellitus patients in the Lubuk Basung health center working area before and after administering cinnamon decoction was 51,500 and the standard deviation was 36,241.

Cinnamon contains eugenol and polyphenols which help increase insulin receptor proteins in cells, so that it can increase insulin sensitivity and reduce glucose levels to near normal. (Azmaina et al., 2021). Cinnamon is a plant that contains flavonoids. Flavonoids are natural organic compounds found in roots, leaves, bark, stamens, flowers, fruit and seeds of plants. The way flavonoid compounds work has been proven to have a beneficial effect in fighting diabetes mellitus,



both through the ability to control blood sugar levels and optimizing the work of the pancreas organ by increasing the sensitivity of pancreatic beta cells so that they can produce the insulin hormone needed to regulate blood glucose levels in the body. (Nurbani Fatmalia, 2017).

The main key to therapy for type II diabetes mellitus is diet and lifestyle modification, such as frequent exercise and stopping smoking and giving cinnamon therapy can be chosen as an alternative treatment to lower blood sugar levels naturally, which is safer and more affordable. Apart from using bay leaves and cinnamon, researchers also provide suggestions for reducing food portions, no longer consuming white rice every day, syrup and sweet cakes.

DISCUSSION

The results of this study indicate a significant reduction in blood glucose levels among patients with type 2 diabetes mellitus after the administration of cinnamon bark decoction over a three-day period. The average blood sugar level decreased from 215.88 mg/dL before the intervention to 163.38 mg/dL after the intervention, with a mean difference of 51.5 mg/dL. Statistical analysis yielded a p-value of 0.000 (< 0.05), indicating that the administration of cinnamon decoction had a statistically significant effect on lowering blood glucose levels.

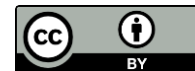
These findings are consistent with previous studies demonstrating the antihyperglycemic effects of cinnamon bark, primarily due to its active compounds such as cinnamaldehyde, eugenol, and polyphenols. These compounds enhance insulin sensitivity by increasing the expression of insulin receptor proteins, inhibiting hepatic gluconeogenesis, and promoting glucose uptake by cells (Camacho et al., 2015; Howard & White, 2012). Cinnamaldehyde has been shown to increase glucokinase activity and glycogen synthesis, while suppressing key enzymes involved in postprandial glucose production, thereby improving glycemic control.

Furthermore, cinnamon contains flavonoids—natural antioxidants found in various plant parts—that support pancreatic function by enhancing the sensitivity of beta cells, enabling better insulin secretion (Nurbani Fatmalia, 2017). This mechanism is particularly relevant in type 2 diabetes mellitus, where insulin resistance and impaired insulin secretion are major pathophysiological factors.

Despite its promising effects, the use of cinnamon bark should be approached with caution. Studies by Perdani and Hasibuan (2021) have reported potential side effects such as liver dysfunction, oral ulcers, respiratory issues, and hypoglycemia when consumed in excessive amounts. The recommended daily dosage should not exceed 4–5 grams and must be monitored, especially in individuals with comorbid liver conditions.

Demographic factors such as age and gender also influence the response to treatment. Most respondents in this study were aged between 60 and 70 years, a group known to have reduced pancreatic beta-cell function due to aging, increasing their vulnerability to glucose intolerance (Silvia Dwi Kusuma Sari, 2021). Moreover, the majority of participants were female, a group shown to be at higher risk for elevated blood sugar levels, especially post-menopause, due to declining protective hormones like estrogen (Irwansyah & Kasim, 2021).

In the Indonesian context, traditional herbal medicine, including cinnamon decoction, is widely utilized in daily healthcare practices. The government's support for herbal medicine through the "scientification of jamu" program has further legitimized its use. However, awareness of



potential interactions between herbal and conventional medicines must be emphasized, as adverse effects may occur if used concurrently without medical supervision.

Overall, this study supports the use of cinnamon bark decoction as a complementary therapy in managing type 2 diabetes mellitus. Nevertheless, broader application and long-term safety require further investigation through randomized controlled trials with larger sample sizes and comparison groups, such as bay leaf decoction, as referenced in the study background.

CONCLUSIONS

Based on the research carried out, the results obtained included that the average sugar level in diabetes mellitus patients before giving cinnamon decoction was 215.88 mg/dL. Apart from that, the average sugar level in diabetes mellitus patients after giving cinnamon decoction was 163.38 mg/dL. So it can be concluded that there is an influence on sugar levels in patients with diabetes mellitus giving cinnamon decoction with The p value (0.005) is $0.000 < 0.05$

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Based on the research results that have been obtained, it is hoped that the public will apply or use cinnamon bark decoction as an alternative treatment for patients with Diabetes Mellitus.

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