THE EFFECT OF MELINJO PEEL TEA ON BLOOD SUGAR LEVELS IN PATIENTS WITH TYPE 2 DIABETES MELLITUS AT GARUDA HEALTH CENTER IN PEKANBARU CITY

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Abstract

Background: There is an increase in the prevalence of diabetes mellitus (DM), the International Diabetes Federation predicts that by 2030 there will be 642.7 million people suffering from DM. Oral antihyperglycemic drugs consumed in the long term can cause side effects such as nausea and diarrhea and can increase the risk of hypoglycemia. Other alternatives are needed in the treatment of diabetes mellitus, one of which is with herbs, namely melinjo peel processed into tea, melinjo peel contains flavonoid compounds that can lower blood sugar levels by acting as an α glucosidase enzyme inhibitor. Objective: to determine the effect of giving melinjo peel tea on blood sugar levels of type 2 diabetes mellitus patients at the Garuda Health Center, Pekanbaru City. Method: quantitative research method with a quasi-experimental pre and post-test design without control. Sampling used a purposive sampling technique involving a sample of 15 people with type 2 DM in the working area of the Garuda Health Center, Pekanbaru City. The research instrument used an observation sheet and a calibrated glucometer. Results: The study used the Wilcoxon range statistical test with negative ranks 12 and positive range 3, meaning that there were 12 respondents who experienced a decrease in blood sugar levels and there were 3 respondents who experienced an increase in blood sugar after being given melinjo peel tea intervention and p value = 0.012. Conclusion: that there is an effect of giving melinjo peel tea on blood sugar levels of type 2 diabetes mellitus patients at the Garuda Health Center, Pekanbaru City. Suggestions for further research are to control factors that can affect blood sugar levels.

Keyword: Diabetes mellitus; herbal tea; melinjo peel; blood sugar levels.

INTRODUCTION

Diabetes mellitus (DM) is a serious and chronic condition that occurs when blood glucose levels increase (hyperglycemia) because the body cannot produce or produce only a small amount of the hormone insulin or cannot effectively use the hormone insulin [1]. According to Harding (2023) Diabetes is caused by several things such as genetics/heredity, insulin resistance, decreased pancreatic function, production of hormones and cytokines by adipose tissue and metabolic syndrome. There are 3 common signs of diabetes symptoms, namely polyuria, polydipsia and polyphagia. Diabetes mellitus will cause complications if not properly managed, complications in diabetes mellitus are in the form of acute and chronic complications. Acute complications that can occur are hyperglycemia crises (diabetic ketoacidosis and hyperosmolar hyperglycemia status) and hypoglycemia. The chronic complications that can occur are divided into microvascular complications (retinopathy, neuropathy and nephropathy) and macrovascular complications (coronary heart disease, cerebrovascular disease, peripheral artery disease, and urinary tract infections).

Globally, DM accounts for 2 million deaths per year. Data from *International Diabetes Federation* (IDF) It is estimated that in 2030 there will be 642.7 million people and in 2045 there will be 783.2 million people suffering from DM. Indonesia is predicted to be in the 5th

position with 28.6 million people with DM in 2045 [3]. For the prevalence of DM in Pekanbaru City based on data from the Pekanbaru City Health Office in 2023, the Puskesmas visits with the most DM cases are the Garuda Health Center with 1,484 visits. The results of the preliminary study conducted by the author showed 418 visits of DM patients in the last 3 months at the Garuda Health Center.

Diabetes management is divided into two, namely non-pharmacological therapies such as education, medical nutrition therapy, physical activity and herbal medicine. Meanwhile, pharmacological therapy is with oral or injectable anti-diabetic drugs [4]. This type of anti-hyperglycemia drug has many types that are used according to the type of diabetes experienced, the use of antidiabetic drugs that are often used are metformin for monotherapy, glimipiride and metformin for a combination of 2 antidiabetic drugs and glimipirid, metformin, acarbose for a combination of 3 antidiabetic drugs [5]. But the results of the study say that metformin causes some side effects, according to research conducted by Putri Maria Nastya(2021) Side effects are nausea, flatulence, hypoglycemia, vomiting and diarrhea. In this case, to overcome this problem, another alternative is needed for DM management, one of the alternatives that can be done is to control blood sugar levels with a complementary approach through herbal medicines. One of the plants that can be used as herbal medicine is melinjo (*gnetum gnemon L.*). The part of this melinjo plant that is still underutilized is the bark. Melinjo fruit peel is still not widely used, this is in line with Apriliana's opinion (2023) that melinjo peel is only used as a sayur asem or even thrown into waste. This condition occurs in the people of Pesalakan Village, Kutowinangun District, Kebumen Regency, who only use melinjo plant seeds to be used as emping and the bark is not used. Melinjo peel contains phytochemical components that have benefits for health, as the results of research conducted by Angel and Parhusip (2024) In the Food Microbiology Laboratory of the Food Technology Study Program, Universitas Pelita Harapan, it was found that the phytochemical components contained in methyl acetate extract of red melinjo bark were alkaloids, phenolics, flavonoids, saponins, and glycosides. One of the phytochemical components contained in melinjo skin is flavonoids, previous studies have said that flavonoids have benefits for the treatment of diabetes. In line with the research conducted by Al-Ishaq (2019) The antidiabetic activity of flavonoids supports the regulation of carbohydrate digestion, insulin signaling, insulin secretion and glucose absorption.

For the processing of melinjo skin, people generally process it to be used as a mixture of asem vegetables, stir-fried melinjo skin and melinjo skin chips. There are also several studies that make melinjo skin tea formula that is preferred by consumers. The author's reason for making melinjo peel tea as the subject of research is because the trend of terbal tea in Indonesia itself is currently very much happening, according to the opinions of Triandini and Wangiyana (2022) Which says that herbal tea products are gaining popularity and experiencing an increase in consumption today. Based on the results of an interview conducted by the author on Monday, November 4, 2024 at the Garuda Pekanbaru Health Center, it was obtained that 7 out of 10 patients with DM felt bored taking medication to control their blood sugar.

Based on this background description, the researcher is interested in conducting research on the effect of melinjo skin tea (*Gnetum gnemon L*) on blood sugar levels of type 2 diabetes mellitus patients. The general purpose of this study is to determine the effect of giving melinjo skin tea on blood sugar levels of people with type 2 diabetes mellitus at the Garuda Health Center, Pekanbaru City.

RESEARCH METHODS

This study uses a quantitative method with an experimental quasy design with a pre and post-test without control approach. Population The sampling technique in this study used a purposive sampling technique with a sample of 15 respondents with type 2 diabetes mellitus in the working area of the Garuda Health Center, Pekanbaru City. The place and time of the research were carried out in the working area of the Garuda health center in Pekanbaru city from January 22, 2025 to January 29, 2025. The research instrument used an observation sheet and a calibrated glucometer. This research has received an ethics permit with registration number 102/IKES PN/KEPK/I/2025.

RESEARCH RESULTS

Respondent Characteristics

Table 1 Distribution of Frequency of Gender, Age, Length of Suffering from DM and Drugs Consumed in DM Patients in the Garuda Health Center working area (N=15)

Characteristics	Frequency (*f*)	Percentage (%)
Gender		
Man	3	20%
Woman	12	80%
Age		
Adult	3	20%
Pre-elderly	12	80%
Long Suffering from DM		
< 1 year	4	26,7 %
1 year	6	40%
2 years	4	26,7%
3 years	1	6,7%
Medications taken		
Metformin	15	100%

Source: Primary Data

Based on table 1, it is known that the gender characteristics of most of the respondents were female as many as 12 respondents (80%) and male respondents as many as 3 respondents (20%). Age characteristics were mostly in the pre-elderly category (45-59 years) as many as 12 respondents (80%). Meanwhile, judging from the length of time they suffered from DM, most of them experienced DM for 1 year as many as 6 respondents (40%), experienced DM for < 1 year as many as 4 respondents (26.7%), experienced DM for 2 years as many as 4 respondents (26.7%) and experienced DM for 3 years as many as 1 respondent (6.7%). And judging from the characteristics of DM drugs consumed, the results were obtained that 15 respondents (100%) overall took metformin drugs.

This research is in line with research conducted by Rizky Rohmatulloh et al (2024) that the most experienced type 2 diabetes mellitus is women compared to men. This is due to differences in lifestyle between women and men such as physical activity, stress and diet. Physical activity affects the incidence of diabetes because lack of physical activity can affect the metabolism of burning in the body which will become a pile of fat, according to research conducted by Astutisari (2022) that people who have a low level of activity are at risk of

developing diabetes. According to research conducted by Suarjana (2023) It was found that men had a higher level of physical activity than women. In addition, stress can also cause an increase in blood sugar levels due to the high hormones cortisol and adrenaline. Research conducted by Anggraeni Reni & Herlina Nunung (2021) stated that there is a relationship between stress and the incidence of diabetes. Stress levels in women are higher than in men, according to research conducted by Kaju et al (2020) Regarding anxiety in patients with diabetes mellitus, the results were obtained that the mean score on anxiety in men (72.40) was smaller than in women (76.96).

This research is in line with research conducted by Susilawati & Rahmawati, (2021) where most patients with type 2 diabetes mellitus are in the pre-elderly age. Age is related to a decrease in body function, namely a decrease in insulin sensitivity which can affect glucose levels in the blood, the older the individual, the individual will experience a progressive shrinkage of pancreatic β cells, so that the hormones produced are too few and cause glucose levels to rise (Komariah & Rahayu, 2020). This research is in line with research conducted by Sri Rahmi (2022) states that most patients with diabetic neuropathy have suffered from type 2 DM for ≥ 5 years. This study is in line with the results of research from Maulidya (2021) which states that patients with DM for a long time have been suffering from DM for 1 year using metformin for the treatment of DM, metformin is recommended because it has a glucose-lowering effect, relatively low cost, low hypoglycemia effect and does not cause weight gain. Research conducted by Rusli (2024) also stated that the widely consumed oral diabetes drug is metformin (93.33%), in addition to metformin being the first line of DM treatment.

Blood sugar levels of respondents before and after being given the intervention to give melinjo skin tea.

Table 2 Distribution of Frequency of Blood Sugar Levels of Respondents Before and After Giving Melinjo Skin Tea Intervention

Variabel		N	Mean	SD	SE	Min	Max
Changes in blood sugar levels	*Pre-test*	15	269.53	47.861	47.861	205	330
	Post-test	15	194.00	67.718	67.718	96	366

Source: Primary Data

Based on table 2, it can be seen that the average value of changes in blood sugar levels before and after being given the intervention to consume melinjo skin tea with 15 respondents obtained an average pre-test score of 269.53 while the post-test score was 194.00.

Table 3 The Effect of Giving Melinjo Skin Tea on Blood Sugar Levels of Type 2 Diabetes Mellitus Patients at the Garuda Health Center, Pekanbaru City

Variabel	n	Negative Ranks	Positive Range	=	With	*P value*
Pre-test – Post-test	15	12	3	0	-2,500	0,012

Source: Primary Data

Based on table 3, it can be seen the results of the analysis of the wilcoxon range with a negative rank value of 12 and a positive range value of 3, meaning that there were 12 respondents who experienced a decrease in blood sugar levels after being given melinjo skin tea intervention and there were 3 respondents who experienced an increase in blood sugar after being given melinjo skin tea intervention. Then to see the value of the effect of giving melinjo skin tea on the blood sugar level of type 2 diabetes mellitus patients, the p value was 0.012 < 0.05 which means that H0 was rejected. Therefore, it can be concluded that there is an effect of giving melinjo skin tea on the blood sugar levels of type 2 diabetes mellitus patients at the Garuda Health Center, Pekanbaru City.

DISCUSSION

Other research conducted by Hasan et al (2020) The results were obtained that Melinjo peel extract showed the presence of flavonoids, tannins, streoids, and saponins. Then the research conducted by Hasriyani et al (2021) The results were obtained that melinjo seed and peel extracts showed antioxidant activity which has a very strong category. Melinjo peel extract has higher levels of total flavonoids than melinjo seed extract. Flavonoids can lower blood sugar levels by acting as enzyme inhibitors α glucosidase (Shirley, 2017). According to research conducted by Indrayani and Mustarichie in (By Komang Angelina Sinta Pratiwi et al., 2023) that flavonoid compounds can lower blood sugar levels by inhibiting the enzyme α-glucosidase through hydroxylation and alternative binding to the β ring, if the activity of α-glucosidase is inhibited, glucose absorption will also be inhibited so that sugar levels in the blood will also be reduced.

Flavonoids are also compounds that act as antioxidants for the body. The antioxidant activity of flavonoids is linked to phenolic-OH groups that can capture or neutralize free radicals. The antioxidant activity of flavonoids is useful in inhibiting intracellular free radical production or increasing the ability of free radical defense enzymes to prevent the appearance of oxidative stress. Oxidative stress in DM patients arises due to the state of hyperglycemia which can induce free radicals and a decrease in the oxidant defense system, chronic hyperglycemia will result in increased free radical production resulting in oxidative stress, oxidative stress conditions induced by hyperglycemia in diabetes mellitus are usually associated with an increase in endothelial cell apoptosis in vitro and in vivo which shows an increase in free radical formation and a decrease in Antioxidant Capacity (Hasan et al., 2023).

Another compound found in melinjo skin is tannins, tannin compounds are polyphenol compounds derived from plants and medicinal plants, which have the ability to reduce oxidative reactions due to free radicals. Based on its chemical structure, it is classified into hydrolyzed tannins and condensed tannins. Tannin compounds have an action mechanism in providing an effect on the treatment of diabetes, namely by increasing glycogenesis so that there is no accumulation of glucose in the blood (Riza et al., 2023).

CONCLUSION

Based on the results of the above research, the researcher concluded as follows:

1. The results of the study from 15 respondents obtained an average pre-test score of blood sugar levels before being given the intervention of giving melinjo skin tea, which was 269.53

2. The results of the study from 15 respondents obtained an average post-test value of blood sugar levels after being given a melinjo peel tea intervention of 194.00
3. The results of the study from 15 respondents obtained a change in blood sugar levels before and after being given the melinjo skin tea intervention of 75.53 mg/dl, with a p value of 0.012 or < 0.05 which means that H0 is rejected. It is concluded that there is an effect of giving melinjo skin tea on the blood sugar levels of type 2 diabetes mellitus patients at the Garuda Health Center, Pekanbaru City.

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