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Papric Ethanol Extract Test (Capsicum Annuum) on Blood Sugar Levels of Wistar Rat (Rattus Norvegicus) Induced Alloxan

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ABSTRACT

This study aims to determine the effect of paprika ethanol (capsicum annuum) on blood sugar levels of alloxan-induced Wistar rats (rattus norvegicus). This type of research is experimental. The method used was pre test and post test with control group design. The results of this study indicate that for Post Test 1 or after being given treatment for 7 days, the average result shows that there is an effect of giving red paprika ethanol extract on blood sugar levels in Wistar rats where the significant value of each treatment is all less than 0.05. For Post Test 2 or after being given treatment for 14 days, only at a dose of 250 that has no effect on blood sugar levels of the rats, because the significant value is 0.813 greater than 0.05, for other treatments it has a significant effect because the significant value is more smaller than 0.05.

1. Introduction

Diabetes mellitus (DM) is a metabolic syndrome characterized by an increase in blood sugar (hyperglycemia) and a disruption in the metabolism of carbohydrates, fats and proteins caused by inlusin secretion or decreased tissue sensitivity to insulin[1]. In general, there are two categories of diabetes mellitus, namely type I diabetes mellitus (where there is absolute insulin deficiency due to destruction of pancreatic β cells) and type II diabetes mellitus (characterized by pancreatic β cells experiencing insulin deficiency and insulin resistance and experiencing ketoacidosis. (2) Diabetes mellitus (DM) has become a world health problem due to the high morbidity and mortality of the disease. The results of this study indicate an increase in the prevalence rate of diabetes mellitus. 387 people. The prevalence of DM sufferers in Southeast Asia is 78.3 people, where Indonesia is ranked seventh in the world with the highest number of people with DM, which is around 10 million people. The number of people with DM continues to increase until 2019 with 463 million people. this is expected to continue to increase until reach 578 million people in 2030 and 700 million people in 2045[3]

One of the main effects of diabetes mellitus is free radicals. In people with diabetes mellitus, oxidative stress will inhibit glucose uptake in muscle cells and pancreatic cells. Therefore, oxidative stress will directly affect the vascular wall

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to the pathophysiology of the complications of type 2 diabetes. To reduce the development of diabetes and complications, an effective strategy must be made, namely by correcting oxidative stress. Sufficient antioxidant compounds are very important for people with diabetes mellitus in preventing complications[4].

Antioxidants are very important to neutralize free radicals. Antioxidants will become non-radical by donating one electron. Antioxidants that are found from outside the body can be obtained synthetically (if used in excess will cause carcinogenic disease) and antioxidants naturally (in the form of caratenoids, vitamin C, vitamin E, selenium and polivenol. Anti-oxidant compounds are found in many plants in Indonesia. One of them is Paprika (Capsicum annuum) which is a type of plant that is quite widely planted in Indonesia. Based on several other types of chili peppers are known to be rich in vitamin C, Even the content is higher than the vitamin C content in oranges. Paprika (Capsicum annuum) has several types based on color, namely green peppers (indicating not ripe), yellow peppers (indicating half ripe) and red peppers (indicating that they are ripe)[5]. The vitamin C content in red peppers is very high compared to other types of peppers, which is 190 mg / 100 g[6]. Alloxan or by another name 2,4,5,6-tetraoxyprimidine; 5,6- dioxyuration is a chemical substance that causes hyperglycemia or experimental diabetes in experimental animals with characteristics such as type I diabetes mellitus in humans. Alloxan works to impair insulin production in pancreatic β cells in the GLUT 2 pathway. Alloxan can also be given intravenously, intraperitoneally or subcutaneously[7]. Based on the high prevalence of diabetes mellitus, the researchers were interested in testing the effectiveness of red pepper extract (Capsicum annuum L.) on blood sugar levels of wistar rats (Rattus norvegicus) induced with alloxan.

2. Methods

This research is included in experimental research. The method used was pre test and post test with control group design. Where the research was conducted at the Laboratory of the University of North Sumatra. The population of this study was male wistar rats (Rattus norvegicus). The sample of this study included Wistar rats (Rattus norvegicus) induced by alloxan. Inclusion criteria, namely, age 3 months, body weight 200-250 grams, healthy condition (active and not disabled). Exclusion Criteria Rats did not move actively, rats died during the study.

3. Results and Discussion

Paprika extract (Capsicum annum L)

Paprika (Capsicum annum L.) is a kind of chili that tastes sweet and slightly spicy. The fruit is large and fat like a persimmon. Paprika is a type of annual herbal plant whose main stem has dense branches. The stems are between 0.5–1.5 meters (20–60 inches) high. The flowers are single and white in color to produce fruits that are green when unripe, but usually red in color, with a purple color when ripe. This species can withstand most climates, even very productive in hot and dry

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climates. Many of the seeds are imported from abroad, including Japan and Taiwan. Paprika comes from South America and is widely developed in Hungary. In Indonesia, paprika is well known, this plant is widely developed hydroponically in Java, Bali and West Nusa Tenggara. There are three types of paprika, namely red, yellow and green peppers (8). Paprika (Capsicum annum L.) contains many natural compounds, which are beneficial for human life. Paprika contains carotene and vitamin A which is the highest. The content of vitamin A is highest in red peppers. Apart from vitamin A, peppers also contain other fat-soluble vitamins, namely vitamins E and K. Red peppers contain high enough lycopene. Paprika is special compared to other chilies, because it contains vitamin C which is very high. The content of vitamin C is much higher than oranges, which have been known as a source of vitamin C. Every 100 g of red bell peppers contains 190 mg of vitamin C, this content is the highest among other types of peppers. Meanwhile, the vitamin C content in oranges is only 30-50 mg per 100 g of oranges. Paprika also contains compounds that are useful as energy, including: protein, carbohydrates, saturated fat and unsaturated fat. Paprika contains a compound that makes it taste spicy, namely capsaicin. The mineral content in paprika is very complete, namely: calcium, iron, potassium, magnesium, phosphorus, sodium, zinc, copper, manganese, selenium and folic acid. Paprika also contains vitamin B complex. The content of vitamin B6 in peppers is categorized as excellent, because peppers contain vitamin B6 with a high density level.

Phytochemical test results of paprika extract (*Capsicum annum L*)

Phytochemical tests are carried out to determine the groups of chemical compounds found in plants. The phytochemical test is carried out using a color reagent and the color change is seen. Phytochemical screening was carried out qualitatively with Fams Worth modification including levels of phenol, flavonids, saponins, triterpenoids, steroids, terpenoids, tannins, alkaloids to provide an overview of the class of compounds contained in the extract of white turmeric. The results of the phytochemical test can be seen in table 1, which are as follows:

This study was to find out about the effect of paprika extract on blood glucose levels in Wistar rats before and after treatment, for the results of this research we can see in table 2 below:

The normality test aims to test whether in the regression model, disturbing variables or residuals are normally distributed. The normality test in the study was carried out using the *Kolmogrov-Smirnov* approach. The normality test uses a significance level of 5%. The basis for the decision-making of the *Kolmogrov-Smirnov* approach is based on:

If the results of *One-Sample Kolmogorov-Smirnov* above the 0.05 significance level indicate a normal distribution pattern, then the regression model meets the normality assumption.

If the results of *One Sample Kolmogorov-Smirnov* below the significance level of 0.05 do not show an abnormal distribution pattern, then the regression model does not meet the normality assumption.

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Blood sugar level normality test (KGD) on day 7 (post test 1)

From table 3 above we can see the results of the normality test for blood sugar level data after treatment until day 7 or Post Test 1, the average significance value is greater than 0.005 or p > 0.05, which means that the data on the Post Test first everything is normally distributed.

Blood sugar level normality test (KGD) on day 14 (post test 2)

From table 4 above we can see the results of the normality test for blood sugar level data after treatment until day 14 or Post Test 2, the average significance value is greater than 0.005 or p > 0.05, which means that the data on the Post Test both are all normally distributed.

Paired T test

Different test with the Paired Sample T-test method is to determine whether there is a difference between all variables or treatments before and after the treatment given to the sample, namely Wistar rats. The theory of the average test T-test is a theory in statistics that is used to test whether a certain value (which is given as a comparison) is significantly different from the average of a sample. To perform the average difference test with the T-test, the data used are quantitative data. Paired sample T-test is used when the data collected from two samples are interconnected, meaning that one sample will have two data. Paired T-test is a hypothesis testing method in which the data used are not independent (paired). The characteristics most often found in paired cases are individuals (research objects) subject to two different treatments. Based on this definition, this study used the paired sample T-test method to determine whether there was an effect of giving red paprika ethanol extract on blood sugar levels in Wistar rats. Two data or groups here are the impact on the research variables between before and after the treatment given to Wistar rats. After the analysis is carried out, it will be seen whether there is a difference between before and after being given treatment to the sample. With the provisions of the significance value in the difference test is = 0.05, if the significance > 0.05 then there is no influence between the two variables, whereas if the significance <0.05 then there is an influence between each variable or treatment.

Paired T Test for post test 1

In table 5 we can see the results of the paired T test which aims to determine whether there is an effect of each variable treatment on blood sugar levels in Wistar rats. The negative significance value in the post-test 1 treatment or for 7 days we can see that the value is 0.000 smaller <0.05, which means that Ho is rejected and Ha is accepted, so it can be concluded that there is an average difference between negative variables on blood sugar levels. in Wistar rats, which means that there is an effect of giving red paprika ethanol extract on blood sugar levels in Wistar rats. The positive significance value in the post-test 1 treatment or for 7 days we can see that the value is 0.001 smaller <0.05, which means

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that Ho is rejected and Ha is accepted, so it can be concluded that there is an average difference between positive variables on blood sugar levels. in Wistar rats, which means that there is an effect of giving red paprika ethanol extract on blood sugar levels in Wistar rats. The significance value of EEPM 250 mg / kg bw in the post test 1 treatment or for 7 days we can see that the value is 0.004 <0.05, which means that Ho is rejected and Ha is accepted, so it can be concluded that there is a difference in the average between variables. EEPM 250 mg / kg bw on blood sugar levels in Wistar rats, which means that there is an effect of giving a dose of EEPM 250 mg / kg bw of red paprika ethanol extract on blood sugar levels in Wistar rats.

The significance value of EEPM 500 mg / kg bw in the post test 1 treatment or for 7 days we can see that the value is 0.014 smaller <0.05, which means that Ho is rejected and Ha is accepted, so it can be concluded that there is a difference in the average between variables. EEPM 500 mg / kg bw on blood sugar levels in Wistar rats, which means that there is an effect of EEPM dosage 500 mg / kg bw of red paprika ethanol extract on blood sugar levels in Wistar rats. The significance value of EEPM 750 mg / kg bw in the post test 1 treatment or for 7 days we can see that the value is 0.000 smaller <0.05, which means that Ho is rejected and Ha is accepted, so it can be concluded that there is a difference in the average between variables. EEPM 750 mg / kg BW on blood sugar levels in Wistar rats, which means that there is an effect of EEPM dosage 750 mg / kg bw of red paprika ethanol extract on blood sugar levels in Wistar rats.

Paired T test for post test 2

In table 4, we can see the results of the paired T test which aims to determine whether there is an effect of each variable treatment on blood sugar levels in Wistar rats given different treatments for 14 days. The negative significance value in the post test 2 treatment or for 14 days we can see that the value is 0.000 smaller <0.05, which means that Ho is rejected and Ha is accepted, so it can be concluded that there is an average difference between the negative variables on blood sugar levels. in Wistar rats, which means that there is an effect of giving red paprika ethanol extract on blood sugar levels in Wistar rats. The positive significance value in the post test 2 treatment or for 14 days we can see that the value is 0.046 smaller <0.05, which means that Ho is rejected and Ha is accepted, so it can be concluded that there is an average difference between positive variables on blood sugar levels. in Wistar rats, which means that there is an effect of giving red paprika ethanol extract on blood sugar levels in Wistar rats. The significance value of EEPM 250 mg / kg bw in the post test 2 treatment or for 14 days we can see that the value is 0.813 greater > 0.05, which means that Ho is accepted and Ha is rejected, so it can be concluded that there is no difference in the average between EEPM variable 250 mg / kg bw on blood sugar levels in Wistar rats, which means that there is no effect of EEPM dosage 250 mg / kg bw of red paprika ethanol extract on blood sugar levels in Wistar rats.

The significance value of EEPM 500 mg / kg bw in the post test 2 treatment or for 14 days we can see that the value is 0.003 <0.05, which means that

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Ho is rejected and Ha is accepted, so it can be concluded that there is a difference in the average EEPM 500 mg / kg bw on blood sugar levels in Wistar rats, which means that there is an effect of EEPM dosage 500 mg / kg bw of red paprika ethanol extract on blood sugar levels in Wistar rats. The significance value of EEPM 750 mg / kg bw in the post test 2 treatment or for 14 days we can see that the value is 0.042 smaller <0.05, which means that Ho is rejected and Ha is accepted, so it can be concluded that there is a difference in the average between the variables. EEPM 750 mg / kg BW on blood sugar levels in Wistar rats, which means that there is an effect of EEPM dosage 750 mg / kg bw of red paprika ethanol extract on blood sugar levels in Wistar rats.

From the analysis that has been carried out in this study, we can see that there are 2 post tests carried out, namely post test 1 at 7 days after being given treatment, and post test 2 after being given treatment for 14 days. The negative significance value in the post- test 1 treatment or for 7 days we can see that the value is 0.000 smaller <0.05, which means that Ho is rejected and Ha is accepted, so it can be concluded that there is an average difference between negative variables on blood sugar levels. in Wistar rats, which means that there is an effect of giving red paprika ethanol extract on blood sugar levels in Wistar rats. The positive significance value in the post-test 1 treatment or for 7 days we can see that the value is 0.001 smaller <0.05, which means that Ho is rejected and Ha is accepted, so it can be concluded that there is an average difference between positive variables on blood sugar levels. in Wistar rats, which means that there is an effect of giving red paprika ethanol extract on blood sugar levels in Wistar rats. The significance value of EEPM 250 mg

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The significance value of EEPM 500 mg / kg bw in the post test 2 treatment or for 14 days we can see that the value is 0.003 <0.05, which means that Ho is rejected and Ha is accepted, so it can be concluded that there is a difference in the average EEPM 500 mg / kg bw on blood sugar levels in Wistar rats, which means that there is an effect of EEPM dosage 500 mg / kg bw of red paprika ethanol extract on blood sugar levels in Wistar rats. The significance value of EEPM 750 mg / kg bw in the post test 2 treatment or for 14 days we can see that the value is 0.042 smaller <0.05, which means that Ho is rejected and Ha is accepted, so it can be concluded that there is a difference in the average between the variables. EEPM 750 mg / kg BW on blood sugar levels in Wistar rats, which means that there is an effect of EEPM dosage 750 mg / kg bw of red paprika ethanol extract on blood sugar levels in Wistar rats.

Table 1. Phytochemical Test Results of Paprika Extract (Capsicum annum L)

No	Secondary metabolites	Reactor	Result
1	Alkaloids	Dragendroff	+
		Bouchardat	+
		Meyer	+
2	Flavonoids	Powder Mg + Amyl Alcohol + HClp	+
3	Glycosides	Molish + H2SO4	+
4	Saponins	Hot water / shaken	+
5	Tannins	FeCl3	+
6	Triterpenes / Steroids	Lieberman-Bourchat	+

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Table 2. Average Blood Sugar Level Measurement Results

Group	Early	Up	H3	H7	H14
Average – Negative	86.4	432	432.6	424.6	387.4
Average Positive	86.6	540.6	387.4	284.4	95.6
Average EEPM 250 mg / kg bw	106.6	393.4	375.6	304	109
The average EEPM was 500 mg / kg bw	99.8	519.8	488.8	379.2	124.2
The average EEPM was 750 mg / kg bw	86.6	564.8	439.6	349.8	104.8

Table 3. Blood sugar level normality test (KGD) Post Test 1

Variable	Std. Deviation	p value
Negative	12.776	0.936
Positive	6.849	0.888
EEPM 250 mg / kg bw	16.891	0.617
EEPM 500 mg / kg bw	6.722	0.879
EEPM 750 mg / kg bw	3.056	0.938

Table 4. Normality test of blood sugar levels (KGD) Post Test 2

Variable	Std. Deviation	p value
Negative	13.767	0.722
Positive	6.725	0.860
EEPM 250 mg / kg bw	17.833	0.849
EEPM 500 mg / kg bw	6.741	0.999
EEPM 750 mg / kg bw	9.861	0.910

Table 5. Paired T Test Results Post Test 1 Paired Samples Test

Variable	Mean ± SD	p value
Negative	343.200 ± 65.339	0.000
Positive	109.800 ± 24.984	0.001
EEPM 250 mg / kg bw	120.00 ± 43.537	0.004
EEPM 500 mg / kg bw	136.200 ± 73.506	0.014
EEPM 750 mg / kg bw	182.000 ± 33.690	0.000

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4. Conclusion

The red paprika ethanol extract show significant effect to reduce blood glucose level.

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