Comparison of Giving Red Rice and Corn Rice against Changes in Blood Glucose Level in Mice

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Abstract: Red cooked rice is red plant rice which is cooked first. Corn rice is one of the typical dishes from Indonesia which is usually made from corn. The aim of this study was to compare giving red rice and corn rice against changes in blood glucose level. Using a true-experimental layout, randomization is carried out in this layout which means grouping parts of the intervention group is based on randoming. Then the pretest (O1) in both groups, and followed by intervention (X) in the treatment group. After some time posttest (O2) was carried out in both groups. The sample selection uses simple random sampling by giving red rice and corn rice for about 4 grams / day / mice to both groups. Statistical analysis of the decrease in blood glucose value in this research used the Independent T-test with a significant $p < 0.05$. The results of the statistical test analysis showed that group A which was given red rice and group B was given corn rice there was no significant difference with the significance value of the SPSS 16.0 statistical test ($p = 0.978$). There are no significant differences in group A (red rice) and group B (corn rice) findings.

1 INTRODUCTION

Blood glucose in the body can function as a fuel for metabolic processes and the main source of energy for the brain. Blood glucose is sugar found in the blood, formed from carbohydrates in food and stored as glycogen in the liver and skeletal muscle. Glucose in the body will be absorbed by the small intestine and then it will be distributed into all cells of the body through the bloodstream. Blood glucose levels can be said to be abnormal if it exceeds or exceeds the reference value which is the range of 60-110 mg / dl for blood glucose at a time. Blood glucose levels that are too high can be said to be hyperglycemia or blood glucose levels that are too low are called hypoglycemia (Subiyono, Martsiningsih and Gabrela, 2013).

According to WHO (World Health Organization) predicts the number of people with diabetes mellitus in Indonesia in 2000 as many as 8.4 million and in 2030 could reach 21.3 million. According to the ADA (American Diabetes Association) in 2010, diabetes mellitus (DM) is a group of metabolic diseases with characteristic hyperglycemia that can occur due to abnormalities in insulin secretion, insulin action, or can be both. Chronic hyperglycemia in diabetes can result in long-term damage, dysfunction or failure of several organs, especially the eyes, kidneys, heart and blood vessels (Amir, Wungouw and Pangemanan, 2015).

Information about the effect of carbohydrate intake on blood glucose levels and insulin response based on the glycemic index (IG) can be useful as a reference in determining the right type and amount of carbohydrate food to maintain and increase healthy food intake. Consuming staple foods that have a low glycemic index (IG) for people with diabetes mellitus (DM) can be useful in controlling blood glucose levels. It can also inhibit digestion, help maintain blood glucose levels and can reduce insulin responses (Septianingrum, Liyanan and Kusbiantoro, 2016).

Brown rice is also one of the foods that have healthy fiber. Brown rice is also rich in vitamins and many benefits for the body. Unlike white rice, brown rice has many nutritional contents that are intact in its rice (Daomukda *et al.*, 2011). In corn having lower protein and fat content, not only corn protein and fat also contain carbohydrates consisting of starch, crude fiber, and pentosan (Lalujan *et al.*, 2017). Rice is one of the many staple foods processed by rice that are usually consumed by the Indonesian people. The

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content of rice usually consists of carbohydrates, fats, proteins and water (Widhyasari *et al.*, 2017).

Based on the above background, researchers are interested in developing previous research comparing brown rice and corn rice so that researchers want to know the comparison of the provision of brown rice (oryza nivara) and corn rice (zea mays L.) to changes in blood glucose levels in animals trying to mice. Glucose level measurement is done directly before and after treatment using GlukoDrTM Blood Glucose Test Meter or Glucometer. The research will be carried out by comparing the two groups namely the brown rice treatment group and the corn rice treatment group to distinguish the amount of blood glucose levels in experimental animals.

2 METHODS

This research is an experimental or experimental research, which is an experimental activity that aims to find out a symptom or effect that arises, as a result of certain treatments. This study uses a true-experimental design, in this design randomization which means that the grouping of members of the intervention group is done randomly or randomly. Then pretest (O1) was done in both groups, and intervention (X) was followed in the treatment group. After some time posttest (O2) was done in both groups (Notoatmodjo, 2012).

The sampling method is the process of selecting portions of a population to represent the population itself. Sampling techniques are ways that can be taken in sampling in order to obtain a sample that is truly in accordance with the whole subject of research. Sampling methods can be classified into 2, namely probability sampling and non-probability sampling. The sampling method of this study uses a probability sampling technique that is simple random sampling. Simple random sampling is the selection of samples in the simplest way, to achieve this sampling, each element is selected randomly, if the sampling frame is small (Nursalam, 2016). The method of sampling is drawn, so all mice are coded and write the code on paper, after that enter the code into a bottle which will be drawn, the code that comes out as many samples as needed is the rat taken into the study sample (Surahman, Rachmat and Supardi, 2016).

The red rice is mixed and homogenized with standard animal feed COMFEED AD II with the amount of brown rice of 225.36 grams / 7 days and 80.64 grams / 7 days, after which it is mixed into one, then printed until it becomes a pellet. The feed is dried at a low temperature of ± 40 ° C for 8 hours using a cabin dryer. Corn rice is mixed and homogenized with standard animal feed COMFEED AD II with total corn rice of 225.36 grams / 7 days and 80.64 grams / 7 days, after which it is mixed into one, then printed to be pellets. The feed will then be dried at a low temperature of ± 40 ° C for 8 hours using a cabin dryer (Daeli and Ardiaria, 2018). Given to animals try mice for 7 days 3 times / day / mice with a dose of intervention given 4 grams / day / mice or about 20% of the body weight of mice. Animals try mice performed a pretest and posttest to take blood glucose procedures as below:1. Prepare the glucometer;2. Experimental animals (mice) are placed in a mouse restriction cage, whose tail sticks out; 3. The tail of male mice is rubbed 70% alcohol using cotton; 4. The male mice's tail is stretched out and cut about 1 mm from the tip of the tail with a sterile razor or scissors; 5. Then the blood that has come out of the tail of mice is inserted into the prepared glucometer stick; 6. Blood glucose levels are tested using a glucometer; 7. The tail of male mice is rubbed with alcohol so that blood does not flow continuously (Mu'nisa *et al.*, 2018).

After the data has been collected, the next step, which is to process and analyze data using the Independent Test, is a method used to test the average similarity of two populations that are independent.

Performing an Independent T-test must meet the following criteria:1. Distribution of normal values, testing for normality using Shapiro Wilk with normal criteria if the value of sig> 0.05; 2. The variance in the two groups is the same which is called homogeneity by using the leven's test. Data will have a homogeneous variant if the value of sig> 0.05, and vice versa if it is not homogeneous; 3. Measurement variables must be independent, which means the value of one subject does not affect an outcome or another subject.

3 RESULTS AND DISCUSSION

During the intervention process the brown rice and corn rice animals were observed every day to observe and measure the activities of the experimental animals, and a summary assessment was obtained from the observation sheet showing the animals were very active, the feathers also did not fall out, their eyes were clear, and no experimental animals were sick , and based on the age of experimental animals that have met the requirements of 2 months and for an average body weight of 20-30 grams after the intervention. The examination was carried out on the first day before the intervention of red rice and corn

rice and was measured again after giving brown rice and corn rice for 7 consecutive days given 3 times a day. Examination on post test using a glucometer with verifer blood taken in the tail of mice.

The results of the study of giving brown rice and corn rice to changes in the value of blood glucose levels in experimental animals group A mice (brown rice intervention) and group B (corn rice intervention) are presented in table 5.2 below:

Based on the data table above shows the difference in the average value of the post-test of the two groups of experimental animals is 4.75 mmHg.

Based on the data above image shows that all samples experienced changes in blood glucose levels after the intervention of red rice and corn rice. Changes in blood glucose values not only in group A (corn rice), but also in group B (corn rice) also experienced changes in blood glucose values, although all groups experienced changes in blood glucose values, but each group had an average value different average. The average difference in changes in blood glucose values (GD) in group A (red rice) from the first day compared to the end on the seventh day was 7.08 mg / dl, and the average difference in changes in blood glucose (GD) values in group B (Corn Rice) from the first day compared to the final value on the seventh day is 6.58 mg / dl. The difference in the value of changes in blood glucose levels between group A (Red Rice) and group B (Corn Rice) by 0.5 mg / dl.

Normality test is performed to determine whether the research sample is a type of normal distribution. The normality test is done by the Shapiro-Wilk test because the number of samples in this study is less than 50. Data is as the table below:

Normality test results on the measurement of blood glucose levels obtained sig> 0.05 so that it can be said that the data on the measurement results of blood glucose levels are normally distributed, so the test is continued with the T-Independent test.

Homegeneity test results using the Levene Test method on the research data are presented as in table 1

Based on the above table, it can be explained that the range of data is homogeneous because the test results obtained significant results (p) the observed factor is 0.098 greater than the value of α 0.05 because the data obtained is homogeneous, then the T-Independent test will be conducted assuming homogeneous assumptions.

Independent t-test is a method used to test the average similarity of two independent populations. T-Independent test results for blood glucose data in group A (red rice) and group B (corn rice) can be seen in table 5.4.

Table 1: Pre-test Results of Blood Glucose in Animals Try Mice Group A (Giving Red Rice) and Group B (Giving Corn Rice).

Participant	Pretest Group A (Red Rice)	Pretest Group B (Corn Rice)
1	238	143
2	93	131
3	117	134
4	96	111
5	198	130
6	150	114
7	117	115
8	71	104
9	92	108
10	137	113
11	98	143
12	105	117
Average	117.66	121.91

Table 2: Results of Difference in Blood Glucose Value in Experimental Animals Group A (Giving Red Rice) and Group B (Giving Corn Rice).

Pretest Group A (Red Rice)		Pretest Group B (Corn Rice)	
Sample	Difference	Sample	Difference
1	-139	A	-27
2	-11	B	-45
3	1	C	-42
4	41	D	3
5	8	E	-11
6	-15	F	-1
7	13	G	19
8	54	H	28
9	33	I	22
10	-80	J	1
11	44	K	-36
12	-34	L	12
Average	-7.08		-6.58

Table 3: Normality Test Results.

Tests of Normality							
	Group	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Difference	Red Rice	.194	12	.200*	.884	12	.098
	Corn Rice	.170	12	.200*	.926	12	.337

a. Lilliefors Significance Correction

*. This is a lower bound of the true significance.

Table 4: Test Results for Homogeneity of Levene Test Variety Data.

Observed Factors (variabel)	Signification	Information	Conclution
Blood Glucose Levels	0,098	Levene test > Sig Sig > 0,05	Homogen

Table 5: Summary of Independent t-test Test Result.

	Group A (Red Rice)	Group B (Corn Rice)	Signification	Information
Difference Blood Glucose Levels	-7,08	-6,58	0,978	There is no significant difference

The results of the study of the value of blood glucose levels obtained from the SPSS output note that the significant value (p), in the T-Independent statistical test the significance value of 0.978 where the value is greater than the value of α (0.05). The results of the two calculations can be concluded that there is no significant difference (H0 is accepted), which means that there is no difference in the provision of brown rice and corn rice to changes in blood glucose levels in mice.

Based on the Independent T-Test obtained a t-test of 0.978 with a significant value of 0.098 and a t-table of 0.028. These results indicate no significant difference in the value of blood glucose levels in group A (Corn Rice) and group B (Corn Rice). There is no difference caused by various factors, as for some

of these factors, one of which is the content in the Red Rice and Corn Rice which acts as a substance that helps the body to help control or stabilize the blood glucose levels so that group A has a value of blood glucose levels that do not much different from group B. The absence of difference is caused by various factors, as for the following factors, namely as follows:

Brown rice also has a high fiber content which is 3.32 grams which means that fiber can prevent gastrointestinal track disease and heart disease (Nuryani, 2013). Red rice also has a fairly low carbohydrate value, carbohydrates are consumed by mice and undergo metabolic processes in the body of mice, carbohydrates are also converted into glucose in the liver and will be useful for energy formation in the human body. Glucose will be absorbed by the small intestine, will be carried by the bloodstream and will be distributed to all cells of the body. Glucose is also stored in the form of glycogen, which is in blood plasma in the form of blood glucose. Glucose in the human body functions as a fuel for metabolic processes and also as a main source for the brain (Subiyono, Martsiningsih and Gabrela, 2013).

Carbohydrates in foods with low glycemic index are broken down slowly so that the release of glucose also becomes slower, low glycemic index can reduce the rate of absorption of blood glucose and increase insulin sensitivity so that it can control or stabilize the value of blood glucose levels. The lower the glycemic index in eating foods the lower its ability to increase blood glucose levels (Herlina, D.N., Nesha, T.R.T., Noor, F., Okki, A., Ebigail, D., Darmawati, 2017).

Corn rice has a fairly low carbohydrate content of 75.64%, corn carbohydrates can be starches, starches contain two kinds of molecules namely amylopectin and amylose, low glycemic index foods are broken down slowly so that the release of glucose also becomes slow, low glycemic index can reduce the rate of absorption of blood glucose and increase insulin sensitivity so that it can control the value of blood glucose levels. In addition to the low carbohydrate content, corn rice also has a fiber content of 0.26 grams, the fiber itself can function to prevent gastrointestinal track disease and heart disease (Lalujan *et al.*, 2017).

Analysis of the results found in this study showed that the animal mice in group A (red rice) and group B (corn rice) experienced changes in the value of blood glucose levels that varied. The results showed that experimental animals that experienced significant changes in blood glucose levels were mice that were in both groups for 7 days, from the results of calculations conducted by researchers using the SPSS computer program to get a difference in group A (Red Rice) as much as - 7.08 mg / dl and in group B (Corn Rice) it was obtained -6.58 mg / dl which means that the two groups had a difference of only 0.5 mg / dl and a sig value of 0.978 above the value of α <0.05 So that H0 was received , there is no difference in the provision of brown rice (Oryza Nivara) and corn rice (Zea Mays L) to changes in the value of blood glucose levels in mice (Mus Musculus L).

4 CONCLUSIONS

Based on the data analysis of the results of research and discussion it can be concluded that the feeding of brown rice in group A and the feeding of corn rice in group B in mice try animals there is no significant difference with a significance value of 0.978 where the value is greater than the value of α (0.05). The results of the two calculations can be concluded that there is no significant difference (H0 is accepted), which means that there is no difference in the provision of brown rice and corn rice to changes in blood glucose levels in mice.

Further research is needed to get accurate results on human samples so that brown rice and corn rice can really be an additional therapy in the morning for people with diabetes mellitus and people who need additional therapy with glycemic index values on foods that are quite low.

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