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Levels of Blood Glucose in Animals Try Wistar White Mix (Rattus Norvegicus) Dined by Green Beans of Sari Bean Packaging

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Abstract

Functional food is food that is naturally or through a process that is beneficial to health. One functional food is a green bean juice packaging beverage that can reduce blood glucose levels. High fiber content, low glycemic index and flavonoids, and polyphenols in green beans (Phaseolus radiatus L) can reduce glucose levels in the blood. This study used experimental animals 7 tails. All experimental animals were given packaged mung bean juice 2 times a day for 9 days by means of a round. The mean results of an examination of blood glucose levels in white rat experimental animals before giving packaged green bean juice drinks was 85 mg dl, while the average results of an examination of blood glucose levels in experimental rats after administration of packaged green bean juice were 75 mg/dl. The results of the Paired T-test statistical test obtained $p = 0{,}000 < \alpha = 0.05$. Packaged green bean juice can reduce blood glucose levels in animals testing white rats.

Keywords: blood glucose, mung bean, functional food, white mice

1. Introduction

Diabetes increases the risk for disorders that predispose individuals to hospitalization, including coronary artery, cerebrovascular and peripheral vascular disease, nephropathy, infection, and lower-extremity amputations. The chronic hyperglycemia of diabetes is associated with long-term damage, dysfunction, and failure of different organs, especially the eyes, kidneys, nerves, heart, and blood vessels.

The management of diabetes in the hospital is generally considered secondary in importance compared with the condition that prompted admission. Recent studies have focused attention to the possibility that hyperglycemia in the hospital is not necessarily a benign condition and that aggressive treatment of diabetes and hyperglycemia results in reduced mortality and morbidity. We know too many treatments for diabetes, one of them is food.

Functional food according to the Food and Drug Supervisory Agency is food that naturally or has been through a process, containing one or more compounds based on scientific studies considered to have certain physiological functions that are beneficial to health (Kurniasih & Rosahdi, 2013). One of the functional foods circulating in Indonesia is green bean extract packaging drinks. Green beans are legumes that are easily found in Indonesia. Green beans have been known to be good for health. Mung beans have a high fiber content of around 7.6 g / 100 g. (Briliansari et al., 2016). Fiber is considered to have a hypoglycemic effect because it influences the increase in insulin secretion and the use of glucose by liver cells, thus reducing blood sugar levels (Iqal et al, 2015). In addition to high fiber content, green beans also have a low glycemic index value of 28.87.

Foods with a low glycemic index can improve blood glucose response and eating foods that have a low glycemic index value help reduce blood glucose levels slowly so that it will help control blood glucose levels in the body (Briliansari et al., 2016). The content of green beans consists of compounds of flavonoids, alkaloids, terpenoids and polyphenols (Aruna et al., 2012). The properties of mung bean seeds are as antimicrobial, anti-inflammatory, antidiabetic, antihyperlipidemic, antihypertensive, diuretic (Tang et al., 2014 in Qodariyah, 2015). Flavonoids are potential antidiabetic agents because flavonoids use several works that are insulinomimetic and antihyperglycemic. Flavonoids are compounds such as phenols which many plants have as glucosidase inhibitors (Candra, 2012). The role of polyphenols as antioxidants is thought to be able to protect pancreatic β cells and maintain insulin content in them (Ridwan et al., 2012). The results of the study by Ridwan et al. (2012) showed that administration of polyphenols in DM mice was able to increase oral glucose tolerance, and lower blood glucose levels in mice, although not to normal limits (Ridwan et al., 2012).

The results of the study by Kartika Mariyona (2017) showed that the administration of green bean juice (P. radiatus L) affected the increase in hemoglobin levels and also influenced the increase in serum ferritin in adolescent girls with anemia in young women with anemia (Mariyona, 2017). Subsequent research conducted by Briliansari et al (2016) showed that administration of green beans (P. radiatus L) was able to prevent an increase in blood glucose levels in pregnant Wistar (R. novergicus) strain of white rats. So the provision of green beans in the form of packaged drinks to reduce blood glucose levels is unknown, it is necessary to do research on the effect of green bean juice drinks (P. radiatus L) on packaging to decrease blood glucose levels in experimental rats (R. norvegicus) wistar strain .

2. Method

This research is a Pre-Experimental research with the research design used is the One Group Pretest-posttest Design. Observations or measurements in this study were blood glucose levels before administering green bean juice packaging and after giving green bean juice drinks. The number of experimental units in this study required 7 animals to test white rat (R. norvegicus) Galur Wistar. The number of subjects used is based on WHO provisions with a minimum sample size of 5 animals, taking into account the risk factors for drop out of 25%, plus 2 rats in each group (Rahmawati & K, 2015). Because the number of samples is only one group, namely the treatment group with a correction factor of 25%, then the number of white mice needed is 5 x 1 = 5 heads, added with a correction factor of 25% = 5 x 25% = 2 tail. So, the total unit of experiment as a whole = 7 tails. Independent variable: packaged green bean extract. Dependent variable: blood glucose level of experimental animals white rats (R. norvegicus) wistar strain. The tools used in this study are: Analytical scales and torbal scales (for BB rats), Experimental animal cages, Cotton, Easy touch GCU blood glucose examination equipment, Multi Check Blood Glucose Test Strips, Handscoon, Operation scissors, Measuring cups, Sonde, The materials needed in this study were: Alcohol 70%, Aquades, packaged green bean juice, Capillary blood animals, white mouse, Standard mouse feed. Research work procedures: Blood glucose levels in experimental rats (R. norvegicus) wistar lines before and after administration of packaged green bean juice were measured using GCU's Easy touch tool. The working procedure is as follows: Acclimatization of experimental animals' white rats (R. norvegicus) wistar lines Acclimatization of experimental animals was carried out for 1 week using water, food and laboratory conditions. This study used white rats (R. norvegicus) male wistar strains with rat body weight of 100-300 grams, aged 3-4 months, with physical health conditions, for several reasons namely easily maintained and bred, easy to take blood and physiologically estimated to be identical to human (Kusumawati, 2004 in (Izzawati, 2017)). Experimental treatment of wistar strain white rats (R. norvegicus): Experimental animals with 7 tails were placed in the same place. Each test animal before treatment was weighed first, and then capillary blood was taken and examined for blood glucose levels as data before treatment. The examination is done using the Easy touch blood glucose test strips. Normal blood glucose levels in mice are 70-110 mg / dl (Tama, Dewi, & Ibrahim, 2012). Treatment group: 7 normal white rats were given packaged mung bean juice 2 times a day for 9 days by means of a round. The volume of packaged green bean juice in each of the experimental animals is different depending on the weight of the experimental animal. To find out the effective volume of packaged mungbean juice drinks on the blood glucose levels of white mice, the conversion formula is used as follows:

$$\frac{BB\ (s)}{BB\ (std)} \times \frac{Dm}{F}$$

Information:

BB (s): Actual rat weight

BB (std): Standard body weight (200 grams):

Dm: Maximum dose given (5 ml)

F: Frequency of packaged green bean juice (2 times a day)

(Harmita & Maksum, 2008 in (Ningrat, 2014))

How to examine blood glucose levels in experimental animals white rats (R. norvegicus) wistar strain: Experimental blood rats (R. norvegicus) wistar strains were taken through capillary blood vessels by cutting the tip of the tail of the animal aseptically while massaging from the callus to tail end slowly. Measurement of blood glucose levels in white rats using the Easy Touch GCU stick method. Data from glucose levels before and after the administration of green bean juice (P. radiatus L) packaging in each experimental unit were tested for normality using the Shapiro wilks test at the level and statistical tests using the Paired T-test with a confidence

level of 95% (α = 0.05) with the help of the SPSS program computer.

3. Result

Data obtained from the results of examination of blood glucose levels of white rats examined before and after being given green bean juice drinks (P. radiatus L) were packaged twice for 9 days, which can be seen in Table 1.

Table 1. Blood glucose levels of white mice before and after giving drinks packaging of green bean Sari

	Blood Glucose Levels of White Mice			
	Before (mg/dl)	After (mg/dl)	Difference before and after (mg/dl)	Percent (%)
1	86	74	12	13,95
2	79	69	10	12,66
3	90	82	8	8,89
4	75	68	7	9,33
5	86	77	9	10,47
6	89	80	9	10,11
7	88	75	13	14,77
Means	84,71	75	9,71	11,47

4. Discussion

Table 1 shows the average blood glucose level in the sample group before being given packaged green bean juice which is 85 mg / dl, then white rats were given standard feed and packaged mung bean juice drinks twice a day for 9 days indicating the mean blood glucose levels of white mice occurred decrease to 75 mg / dl. To determine the effect of a decrease in blood glucose levels in experimental animals, white rats (R. norvegicus) by packing packaged mung bean juice was carried out by statistical analysis Paired T-test. The probability results of the Paired T-test Test 0,000 <α = 0.05, thus Ho which states there is no effect of giving green bean juice drink (P. radiatus L) packaging to blood glucose levels in the experimental animal White rat (R. norvegicus) Wistar was rejected and Ha was accepted, which meant that there was an effect of giving green bean juice extract (P. radiatus L) packaging to blood glucose levels in the experimental animal white rat (R. norvegicus) Galur Wistar.

The mean results of examination of blood glucose levels in white rats before being given treatment were 85 mg / dl and the mean results of examination of blood glucose levels in white rats after being treated were 75 mg / dl which showed a decrease in blood glucose levels of 10 mg / dl. This research is reinforced by previous studies conducted by (Briliansari et al. 2016) about the effect of giving green beans (P. radiatus L) to the prevention of increased blood glucose levels in rats (R. novergicus) pregnant wistar strains. Based on research conducted by giving green beans (P. radiatus L) was able to prevent an increase in blood glucose levels in white wistar (R. novergicus) strain of white rats. (Briliansari et al 2016).

Based on the results of statistical tests, the administration of green bean juice (P. radiatus L) packaging to the blood glucose level of white mice (R. norvegicus) has a significant difference because the probability value is 0,000 <α 0.05 means that Ho is rejected and Ha is accepted, meaning there is the effect of giving green bean juice drink (P. radiatus L) packaging to decrease blood glucose levels in animal experiments male white rats (R. norvegicus) wistar strain. The decrease in blood glucose levels is caused by dietary fiber. Dietary fiber can delay or slow down gastric emptying so that the feeling of fullness lasts longer which results in reduced calorie intake and interfering with or slowing the absorption of glucose into the blood. In such circumstances insulin secretion is also reduced so that it can reduce blood glucose levels (Tama et al. 2012). There are also some ingredients in green beans that can reduce blood glucose levels, namely flavonoids and polyphenols.

Flavonoids can reduce blood glucose levels with their ability as antioxidants. Antioxidants in flavonoids can donate hydrogen atoms. Flavonoids will be oxidized and bind to free radicals so that free radicals become more stable compounds. Antioxidants can bind to free radicals that have been proven in Ruhe et al's study, so that it can reduce insulin resistance (Ajie, 2015). Polyphenols also have the ability to reduce blood glucose and act as antioxidants. Polyphenols are bioactive compounds that act as lowering blood glucose because they can inhibit

glucosidase and amylase activity and increase insulin secretion and sensitivity. This bioactive ability to reduce free radicals has been widely used as an antioxidant for food and health. (Diabetes ACT et al., 2012; Holmstrup, Owens, Fairchild, & Kanaley, 2010)

Hajiaghaalipour et al (2015) explained that polyphenols have the ability to increase insulin secretion through the insulin signaling pathway by increasing the availability of glucose transporter 2 in β-pancreatic cells (Firdaus et al 2017). Mung beans also have a low glycemic index value of 28.87. The glycemic index value is categorized as low if <55, medium category 55-70, and high category> 70. The glycemic index of food is related to whether or not the food is easy to digest. Foods with a low glycemic index are generally caused because these foods contain high fiber. The mechanism of food fiber in influencing the glycemic index of a food is to reduce the efficiency of absorption of carbohydrates, thus inhibiting the increase in blood glucose levels in the body. The higher the digestibility and absorption of a food, the faster the food increases blood glucose levels, so the higher the glycemic index value of the food (Apriani, 2015).

The results showed that the average glucose level examination results decreased even though the decline was not too high. This is because the given green beans have been processed. Food of the same type if processed using different methods can have a different glycemic index. (Thompson, Winham, & Hutchins, 2012)

This can occur because processing can cause changes in the structure and chemical composition of food. The food glycemic index is a very unique nature of food, influenced by the type of material, method of processing, characteristics (composition and biochemical properties) of the material and particle size (Septianingrum, Liyanan, & Kusbiantoro, 2016)

5. Conclusion

The mean results of examination of blood glucose levels in experimental white rats (R. norvegicus) wistar lines prior to the administration of green bean juice drinks (P. radiatus L) were 85 mg / dl. The mean results of examination of blood glucose levels in experimental white rats (R. norvegicus) wistar strains after administration of green bean juice drinks (P. radiatus L) packaging is 75 mg / dl. There is an effect of giving green bean juice drink (P. radiatus L) packaging to decrease blood glucose levels in experimental animals of white rats (R. norvegicus) wistar lines with a value of p (0,000) <α (0.05).

Functional foods such as packaged green bean juice drinks can be used to reduce blood glucose levels. Further research is needed on reducing blood glucose levels with self-made green bean juice drinks.

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