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The Effect of Corn Silk Ethanol Extract (Zea Mays. L) on Decreasing the Blood Glucose Levels

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Abstract. Diabetes mellitus is a chronic metabolic disease which impacts on serious complications. Corn Silk complementary herbal therapies were effective in decreasing blood glucose levels. The study aimed to examine the effect of corn silk ethanol extract (Zea mays L) on reducing the blood glucose levels. This study used a true experimental, pre-test, and post-test with the non-equivalent control group. Eighteen mice tail samples were recruited using random allocation technique sampling and divided into two groups (interventions and control groups). Data analysis was performed and presented in descriptive statistics, and significant findings were computed using the paired t-test. The results showed that the decrease in Glucose intervention group downhill from 144,33+11,543 to 137,78+5,740 after the intervention.
Meanwhile, in the control group, the mean in Glucose increases from 134,00+10,124 to 153,78+7,412. The paired t-test obtained a p-value of 0.000, indicating that there were significant differences in the effect of giving Corn Silk ethanol extract (Zea mays L) to decrease glucose levels the intervention and the control group. Conclusion: Giving Corn Silk Ethanol Extract (Zea Mays L) can lower Glucose Levels.

Keywords: corn silk, ethanol extract, blood glucose levels

INTRODUCTION

Diabetes mellitus (DM) is a chronic metabolic complication that is serious and can cause an increase in world mortality rates (1). Data from the International Diabetes Federation show that globally the incidence of DM in 2017 reached 425 million cases and is estimated to increase to 629 million in 2045. In 2017 the most significant cases of diabetes reached 327 million cases at the age of 20-64 years. In Southeast Asia, the prevalence of DM is estimated to increase by 84%, and Indonesia is ranked 6th in the world, with the highest incidence of

DM is 10.3 million cases (2). Based on the results of the Basic Health Research (Riskesdas) in 2018, the prevalence of DM based on blood tests in residents over the age of 15 years in 2013 amounted to 6.9%, increasing to 8.5% in 2018. Diabetes mellitus with complications was obtained 81, 2% have chronic complications of at least one disease. The organs that most often experience disorders are the cardiovascular system as much as 25%, kidney disorders 22%, lung disorders 19%, gangrene and abscesses 11%, urinary 4%, alimentary 3%, innervation system 3%, eyes 3% and other diseases 10 % (3). The proportion of DM control efforts in residents diagnosed with DM by doctors found food regulation data of 80.2%, sports 48.1%, and herbal alternatives 35.7% (2).

Increased blood sugar in people with DM occurs because of the body's failure to produce insulin (2). The function of insulin is to stimulate glucose transport to fat cells and muscles. But in people with DM, there is a decrease in the amount of insulin, so it cannot stimulate glucose uptake by the tissue. Lack of insulin secretion will result in the absorption of glucose from the blood circulation through glucose transporters, and GLUT is disrupted (4). Under physiological conditions, glucose uptake into cells is regulated by insulin and the speed of transport of glucose through a specific protein associated with the plasma membrane and facilitated by glucose transporter (GLUT). GLUT transporters 1-4 are glucose transporters for glucose, but those that respond to insulin in muscle tissue and adipose in both humans and rodents are only GLUT 4 (5). High hydrogen compounds can trigger GLUT 4 translocations, alkaline water is high hydrogen water, which can promote GLUT 4 translocation to cell membranes in the absorption of glucose to reduce blood glucose levels (6).

The incidence of DM patients from year to year tends to increase. DM control efforts through health promotion, community empowerment in increasing early vigilance in monitoring DM risk factors have been carried out. However, the incidence of DM in Indonesia is still high (2). One of the efforts made by the community is the use of herbal, complementary therapies. Corn silk is one of the complimentary herbal alternatives used by people in China for decades (7). In addition to corn silk, the use of alkaline water has benefits as a therapy for gastrointestinal diseases, hypertension, diabetes, and cancer (8).

Corn silk is known as one of the traditional herbal medicines in China, Turkey, the United States, and France, which has many hypoglycemic, anti-tumor, anti-oxidant, and others (9). Meanwhile, corn silk also contains the working mechanism of bioactive plant constituents such as flavonoids, terpenoids, etc.

Corn Silk also contains the working mechanism of plant bioactive constituents such as flavonoids, terpenoids, etc. Pharmacological studies have proven that this traditional herb is found to have medicinal properties such as anti-oxidants, antidepressants, antihyperlipidemic, antidiabetic, anti-inflammatory, nerve toxicity, and more benefits (10). Bioactive compounds are essential, and non-essential compounds (eg, vitamins or polyphenols), which are found in nature, become part of the food chain and have an influence on the health of the human body. Produced by organisms via biosynthetic pathways secondary metabolites. In Corn Silk, bioactive compounds include alkaloids, flavonoids, quinones, saponins, tannins, and steroids/triterpenoids, and contain anti-oxidants. Flavonoids in Corn Silk function to repair pancreatic β cells, which can stimulate insulin secretion. The use of Corn Silk in Indonesia is not very popular with most people. Therefore this study uses animals to try balbc mice (Sani, 2016)

OBJECTIVE

The study aimed to examine the effect of Corn Silk ethanol extract (Zea mays l) on decreasing the blood glucose levels.

METHOD

This study used a true-experimental, pre-test, and post-test with non-equivalent control group was applied in this study. Eighteen mice tail samples were recruited using random allocation technique sampling and divided into two groups (interventions n=9 and control groups n=9). The Inclusion criteria: Male mice, healthy physical condition, active movement, characteristic white and soft hair texture, red eyes, and pink tail, no anatomical abnormalities, age 2.5 - 3 months (± 12 weeks), and BB between 20- 30gr.

The intervention group is given ethanol extract of corn silk with a dose of 2.52g using mineral water with an average pH of 7. The treatment offered is 2.52g / day via a nipple drinker. Performed 1x / day for two weeks, and the positive control group was untreated hyperglycemic mice. Objective and subjective measurement was performed before and after the intervention. The collected data were analyzed using the paired t-test.

The study was Experimental animal studies that must pay attention to animal welfare principles, which consist of 5F, namely: Freedom from hunger and thirst, freedom from pain, Freedom of injury and diseases, Freedom to express their normal behavior, and freedom from distress and feeling discomfort. The research ethics committee approved the study of the Faculty of Nursing, Universitas Airlangga.

RESULTS

Characteristics of mice tail weight

Table 1. showed that the characteristics of respondents based on weight, most respondents have weight 27 gm as many as 6 Mice tail (33.3%)

Table 1 Characteristics of mice tail weight

Weight	Total	Percentage (%)
25	4	22.2
26	5	27.8
27	6	33.3
28	2	11.1
30	1	5.6

Effect of Corn Silk ethanol extract (Zea mays L) to decrease glucose levels

Table 2 showed that the glucose level among the intervention group before receiving an ethanol extract of corn silk dissolves mineral water was 144.33. In contrast, after receiving the intervention, the blood glucose level was 137.78. Regarding the blood glucose level among the control group showed that before receiving the intervention, the blood glucose level was 134.00 mg/dl while after receiving the intervention, the blood glucose level increased to be 153.78 with p-value was 0.000. It was indicated that there were significant differences in blood glucose levels before and after receiving the intervention among the intervention and control group.

Table 2. The effect of corn silk ethanol extract (Zea mays L) on decreasing blood glucose levels

Variable	Intervention		Delta Δ	Control		Delta Δ	*P value*
	Pre	Post		Pre	Post		
	Mean ± SD	Mean ± SD		Mean ± SD	Mean ± SD		
glucose levels	144.33±11,543	137.78±5,740	6.556	134.00±10,124	153.78±7.412	19.778	0.001

*paired t-test for differences groups ($p<0.05$)

DISCUSSION

The results showed that the ethanol extract of the Corn Silk intervention group, there was a decrease in Glucose Levels of 6.556, while the control group has increased in Glucose Levels of 19.778. These results are supported by research (11) that corn silk plants have benefits as anti-diabetes, which is beneficial by regulating lipid metabolism and removing oxygen radicals, which protect an organism's metabolism and improve capacity anti-oxidant. Also, corn silk shows that corn has many ingredients, including alkaloids, flavonoids, phenols, saponins, tannins, and fitosterol, which can indicate the presence of inhibitory activity α amylase and α glycosidase so that the inhibition of this enzyme can control hyperglycemia (1). If added with alkaline water, it will be even more effective (12). Water with high hydrogen content can control glucose in the blood by increasing glucose uptake by muscle cells.

Phytochemical screening includes examining the presence of alkaloid groups, flavonoids, quinones, saponins, tannins, and steroids/triterpenoids, and containing anti-oxidants. Antioxidants are chemicals that help protect the body from damage to cells by free radicals. Antioxidants are natural nutrients found in certain fruits and vegetables and have been shown to protect human cells from oxidative damage and provide other benefits (13). Drying is an attempt to reduce the water content of the material to the desired level and eliminate the enzyme activity, which can further describe the active ingredient. Drying also aims to facilitate management and to be more resistant to being stored for a long time.

According to research conducted by Komar Ruslan Wirasutisna, Irda Fidrianny, and Annisa Rahmayani, 2012 extract of corn silk was carried out by continuous extraction method using Soxhlet tools with n-hexane, ethyl acetate, and ethanol. Extracts were monitored using thin-layer chromatography (TLC) with the stationary phase of silica gel GF254 and various types of mobile phases. The appearance of the spots used was 10% sulfuric acid in methanol, which was observed under ultraviolet (UV) at wavelengths (λ) 254 nm and 366 nm (14).

CONCLUSION

Providing the corn silk ethanol extract (Zea Mays L) can decrease Decrease Glucose Levels. This research has been attempted and carried out in accordance with scientific procedures, but still has limitations, including this study has not observed the condition of pancreatic β cells, and this study is still a laboratory test using experimental animals. Hence, toxicity testing and further clinical trials need to be conducted.

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