Effect of Guava Leaf Extract (*Psidium guajava*) and Banyan Leaf (*Ficus benjamina*) on Glucose Levels in Mice (*Mus musculus*)

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Abstract: Guava leaves (Psidium guajava) and banyan leaves (Ficus benjamina) both contain tannins, flavonoids, carotene and iron. This study was conducted with the aim of knowing the effect of guava leaf extract and banyan leaf on glucose levels in the blood of mice. The study was conducted with an experimental method using Easy touch completely randomized with). Guava leaf extract and banyan leaf extract were administered for 14 consecutive days to mice at a dose of 300 mg/kg/day. The results showed that guava leaf and banyan leaf extract increased glucose levels in the blood of mice. guava leaf extract glucose by 4.52% and banyan leaves by 0.45%. So it can be said that offering guava leaf extract and banyan leaf extract with certain doses and treatments can increase glucose levels in test animals

1 INTRODUCTION

Glucose is needed by the body because glucose is the main source of energy (Pratiwi, 2011). Glucose is found in the blood which is formed from carbohydrates in food and stored as glycogen in the liver and skeletal muscles (Umami, 2013). Normal blood glucose levels are below 200 mg/dl. In a fasting state, normal blood glucose levels are < 100 mg/dl, and those with diabetes are > 126 mg/dl. Meanwhile, 2 hours after eating, normal blood glucose levels are < 140 mg/dl and those with diabetes are 180 mg/dl. The concentration of blood glucose must also be maintained so as not to increase too high because glucose greatly affects the osmotic pressure in the extracellular fluid. If the concentration of glucose is increased excessively, it can lead to cellular dehydration. Then, if very high blood glucose concentrations cause glucose to be found in the urine and the above conditions can cause kidney diuresis, which will reduce the amount of body fluids and electrolytes (James, 2012).

Excess glucose or lack of glucose greatly affects the health of the body. Excessive sugar in the body is caused by an increase in blood sugar (glucose) levels due to a lack of insulin, both absolute and relative. Insulin is a hormone produced by beta cells in the pancreas, a gland located behind the stomach that functions to regulate glucose metabolism into energy and convert excess glucose into glycogen (Nugroho, 2019). Excessive sugar in the body is also not good because it will have a negative impact on health, such as increasing body weight, increasing the risk of developing diabetes and high blood pressure and accelerating experiencing senile problems and premature aging (Liyani *et al*., 2021).

A lack of glucose can cause a fast heart rate and heart palpitations. However, even if you have diabetes, you may not always have obvious symptoms of low blood sugar. This potentially dangerous condition is called hypoglycemic unconsciousness. There are several plants that can increase glucose levels in the body, namely guava and banyan plants. The leaves on both plants can be used to increase glucose levels with a certain dose.

Guava (*Psidium guajava*) is one of the plants that is widely used in traditional medicine (Gunawan *et al*., 2001). Guava leaves contain tannins, flavonoids, carotene, and iron which are believed to lower blood glucose levels (Islamiyah, 2010). In accordance with the theory put forward by Anastasia Bangun

(2004), that guava leaves contain tannin compounds that function as glucosidase inhibitors that are useful for delaying glucose absorption after eating, thereby inhibiting postprandial hyperglycemia conditions. Calcium in guava leaves is able to increase the production of pancreatic cells to produce insulin (Simon, 2002).

Banyan plant (*Ficus benjamina*). is one of the plants from the Moraceae family that is easy to grow in various land conditions including dry land (Veneklaas *et al*., 2002; Balfas, 2016). Banyan trees grow with hanging roots that grow larger and merge with the main trunk, so that the banyan tree trunk is irregularly shaped and the wood is not used optimally (Utari *et al*., 2020). Banyan leaves for health such as diarrhea medicine, healthy digestion, constipation and prevent ulcers. The leaves of this plant also contain saponins, flavonoids, and alkaloids that can inhibit the growth rate of cancer cells (Nomleni *et al*., 2020). In view of the pharmacology of flavone compounds contained in banyan flavonoids are considered to be able to overcome anti-inflammatory, antioxidant and antimicrobial. This study aims to determine the effect of guava leaves and banyan leaves at a dose of 300 mg/kg BW/day on glucose levels in mice (*Mus musculus*).

2 METHODS

This study used a completely randomized design experimental method by giving Guava leaves (*Psidium guajava*) and banyan leaves (*Ficus benjamina*) extract at a dose of 300mg/kg BW mice orally for 14 days. The mice used in this study were mice aged 2-3 months with a body weight of 20-30 grams. Analysis of glucose levels was carried out by taking blood directly from the heart of mice and then putting it into an eppendorf *tube* that had been given 0.05 ml of EDTA. Then tested using *Easy Touch* with glucose test strips. The results obtained were then compared with the control group to determine the difference in glucose levels in mice that were treated with Guava leaves (*Psidium guajava*) and banyan leaves (*Ficus benjamina*) and those that were not.

Research Time and Place

This research was conducted at the Integrated Laboratory of the State Islamic University of Sunan Ampel Surabaya in June-July 2022.

Tools and materials

The tools used in this study were cages and drinking containers, glass beakers, analytical scales, 2.5 ml syringes, digital scales, Ependorf 50 ml, surgical instruments, masks, gloves, syringes, sonde needles, HBCU Accu Check, HB strips. 48, microscope, slide and cover slip.

The materials used in this practicum are mice (*Mus musculus*), guava seed leaf extract, banyan leaf extract, aquades, NaCl and Giemsa.

3 RESULTS

Based on the treatment that has been done, obtained an increase in glucose levels. Can be seen in the following table.

Table 1 : Glucose Levels

Test Groups	Glucose Levels
C1	61 mg/dl
G1	337 mg/dl
B1	89 mg/dl

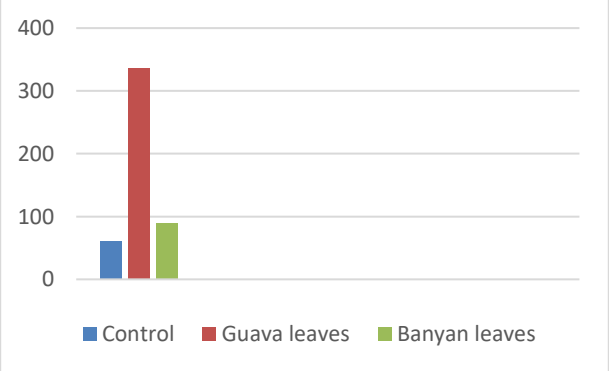

Figure 1. Glucose Levels

C1 : treatment control on mice
G1 : guava leaf treatment on mice
B1 : banyan leaf treatment on mice

Based on the table above, there are differences in blood glucose levels in mice, where glucose levels from other treatments have increased. The treatment using guava leaf extract and banyan leaf experienced a significant increase, namely from the control treatment which showed 61 mg/dl, guava leaf extract increased glucose levels by 4.52%, and banyan leaves increased blood glucose levels by 0.45%. According to Yuda *et al* (2015) The increase in glucose levels was caused by the administration

of a dose of a. Guava leaf extract and banyan leaf extract were given to mice 300 mg/kg BW/day which caused blood glucose levels to increase.

4 DISCUSSIONS

Guava leaves contain active compounds including gallic acid, catechins, polyphenols, polysaccharides, methanol, and components of flavonoids consisting of quercetin, kaempferol, guaijaverin, avicularin, myricetin, hyperin, and apigenin. The compounds contained in guava leaves have a role in reducing blood glucose levels (Guspratiwi *et al*., 2019). However, in mice that were treated, there was a significant increase in glucose levels from the treatment, namely 61mg/dl, while the guava leaf extract was 337 mg/dl which showed above average or abnormal because it exceeded 200 mg/dl (James *et al*. 2012). The thing that supports that can cause an increase in blood glucose levels is the dose. According to Pratiwi *et al* (2022) the effective dose of guava leaf extract used to reduce blood glucose levels is 150 mg/kg BW/day. Meanwhile, what is used in this study is 300 mg/kg BW/day. This allows the blood to increase its glucose levels.

Banyan leaf extract experienced an increase that was not much different when compared to the treatment treatment, which was 89 mg/dl. According to Nomleni *et al.,* (2020). Extracts from banyan leaves contain flavonoid compounds, one of which is antidiabetic which can reduce blood glucose levels. However, in this study, banyan leaf extract increased blood glucose levels. The dose of extract that exceeds the level that allows glucose levels in the blood to increase but not so much difference between the control treatment and banyan leaf extract. The results of the administration of banyan leaf extract on blood glucose levels was 89 mg/dl which indicated that blood glucose levels were normal.

From the two plants, it turned out that there was an increase with a dose of 300 mg/dl. So it can be used for people with hypoglycemia. Blood glucose levels can increase if the pancreas experiences insulin inhibition in the blood so that the blood lacks insulin and there is an increase in blood glucose levels (Afrianti., 2018).

5 CONCLUSIONS

Based on this research, it can be said that the use of guava leaf extract and banyan leaf extract at a dose of 300 mg/dl can cause an increase in blood glucose levels. Guava leaves have increased glucose levels by 4.52% and banyan leaves have increased blood glucose levels by 0.45%.

6 REFERENCES

Afrianti, R. 2018. Pengaruh Pemberian Fraksi Etilasetat Kulit Ubi Jalar Ungu Terhadap Kadar Malondialdehid (Mda) Serum Mencit Putih Jantan Hiperglikemia. *Scientia : Jurnal Farmasi Dan Kesehatan*, 8(2), 144

Anastasia, N., Yakobus, S., & Susilawati, C. 2004. Analisa investasi dalam pengambilan keputusan investasi pada pengembangan lapangan golf dan Perumahan Citraraya. *Jurnal Manajemen dan Kewirausahaan*, 3(1), pp-14.

Balfas, J. 2016. Struktur Anatomi dan Kualitas Serat Kayu dan Akar Gantung Beringin (*Ficus benjamina* Linn.). *Jurnal Ilmu Pertanian Indonesia*, 21(1), 13-19.

Gunawan, D., Sudarsono, Wahyuono, S., Donatus, I. A., & Purnomo. 2001. Hasil Penelitian, Sifat-Sifat dan Penggunaan Tumbuhan Obat 2. Yogyakarta: PPOT UGM.

Guspratiwi, R., Mursyida, E., & Yulinar, Y. 2019. Pengaruh Ekstrak Etanol 96% Daun Jambu Biji (*Psidium Guajava L*.) Terhadap Kadar Gula Darah Tikus Wistar Jantan (*Rattus novergicus*) Yang Diinduksi Aloksan. *Collaborative Medical Journal (CMJ),* 2(3), 106-116.

Islamiyah, D. 2010. Pengaruh pemberian ekstrak buah jambu biji (*Psidium guajava*. L) terhadap kadar kolesterol total, HDL, LDL, dan trigliserida darah tikus putih (*Rattus norvegicus*) yang diinduksi aloksan (Doctoral dissertation, Universitas Islam Negeri Maulana Malik Ibrahim).

James Akiles Utility, A. 2012. Keadaan Puasa Terhadap Kadar Glukosa Darah Tikus *Rattus Norvegicus*. *JESBIO*, 1(1), 29–33.

Liyani, N. I., Salsabila, A., Gusnadi, D., & Mulyati Karsiwi, R. R. 2021. Inovasi Kue Lumpur Berbasis Kurma Bagi Kesehatan. *eProceedings of Applied Science*, 7(5), 1494-1502.

Nomleni, F. T., Manu, T. S. N., Daud, Y., & Meha, A. M. 2020. Buku Ajar Etnobotani Masyarakat Lokal Desa Kakaniuk. Penerbit Lakeisha.

Nugroho, R. B. 2019. Pemeriksaan dan Penyuluhan Glukosa Darah dan Asam Urat pada Lansia di RW 22 Kelurahan Nusukan Kecamatan Banjarsari Kota Surakarta. Empowering: *Jurnal Pengabdian Masyarakat*, 3, 58.

Pratiwi, I. Y. 2011. Pengaruh variasi maltodekstrin terhadap kualitas minuman serbuk instan kayu manis (*Cinnamomum burmanii* Bl.) (Doctoral dissertation, UAJY).

Pratiwi, F. D., Yanuarty, R., Dewi, N. P., & Magfirah, M. 2022. Uji Efek Ekstrak Etanol Daun Jambu Biji Terhadap Penurunan Kolestrol Tikus Putih Jantan Diinduksi Pakan Tinggi Lemak Dan Streptozotocin. *Farmakologika*:*JurnalFarmasi*, 19(1), 78-86

Simons, J. W. F., Kosters, H. A., Visschers, R. W., & de Jongh, H. H. 2002. Role of calcium as trigger in thermal β-lactoglobulin aggregation. *Archives of biochemistry and biophysics*, 406(2), 143-152.

Umami, A. K. 2013. Perbedaan Kadar Gula Darah Sebelum Dan Sesudah Senam Diabetes Pada Pasien Diabetes Mellitus Tipe 2 Di Persadia Rumah Sakit Sari Asih Ciputat Tahun 2013.

Utari, D ., Vanya, A., Lisya, D., Distrima, E., Husna, N., Tmelri, R., Selvika, & Diliarosta, S. 2020. Nature Conservation Regarding Trees in the Padang Area. *Journal of Science Education and Teaching*, (3)1, 19-29

Veneklaas EJ, Santos-silva MPRM, den Ouden F. 2002. Determinants of growth rate in *Ficus benjamina* L. compared to related faster-growing woody and herbaceous species. *Scientia Horticulturae*. 93(1): 75-85.

Yuda, A. A. G. P., Rusli, R., & Ibrahim, A. 2015. Kandungan Metabolit Sekunder dan Efek Penurunan Glukosa Darah Ekstrak Biji Rambutan (*Nephelium lappaceum* L) Pada Mencit (*Mus musculus*). *Jurnal Sains dan Kesehatan*, 1(3), 120-125