Drh._Dwi_Prosiding.pdf

by Dwi Kesuma Sari

The Influence of Some Plant Extracts that are Potential in the Antichiperglicemia

IOP Conf. Series: Journal of Physics: Conf. Series **1244** (2019) 012017 doi:10.1088/1742-6596/1244/1/012017

The Influence of Some Plant Extracts that are Potential in the Antichiperglicemia

A. Mu'nisa*, Syamsia, Rachmawaty
Faculty of Mathematics and Natural Science, Universitas Negeri Makassar, South Sulawesi, Indonesia

A. Muflihunna
Faculty of Pharmacy, Universitas Muslim Indonesia, South Sulawesi, Indonesia

Dwi Kesuma Sari
Faculty of Veterinary Medicine, Universitas Hasanuddin, South Sulawesi, Indonesia

*Corresponding author: andi.munisa@unm.ac.id

Abstract. The underline of this study to investigate the antihyperglycemic effect in mice groups. The plants that have been tested as anti-hyperglycemia are cat root leaves (*Acalypha indica*), maja leaves (*Crescentia cujete* L.), and alang-alang plants (*Imperata cylindrica*). This study used 45 ICR male mice divided into 3 treatment groups, namely the normal mouse group, hyperglycemic mice group, and mice group with the provision of cat leaf extract, maja leaves, and alang-alang plants with a dose of 250 mg kg-1 bw. The results show that the administration of these three plants can reduce the blood glucose levels of mice by 22-27%. The conclusion in this study was that the extract of cat's root leaves (*Acalypha indica*), maja leaves (*Crescentia cujete* L.), and alang-alang plants (*Imperata cylindrica*) showed an effect as anti-hyperglycemia.

Keywords: antihyperglycemic, cat root leaves (*Acalypha indica*), maja leaves (*Crescentia cujete* L.), alang-alang plants (*Imperata cylindrica*)

Introduction

Free radical oxidative stress, usually resulting from deficient natural anti-oxidant defenses, the pathogenesis effect came from unwanted oxidation process in the human body. As a result, the wide variety of degenerative disease has been happening such as aging and the progressive decline in the immune functions. The pathological roles of free radicals have been implicated in a wide range of inflammatory diseases 2. As well as, it has been reported that hypercholesterolemia is increased free radical production and reduced the free radical scavenging effect. Therefore, certain natural products with antioxidant activities may have potential anti-hyperglycemia actions.

Diabetes mellitus (DM) is characterized by the inability of a body function to break down sugar from food to produce energy. There are 2 kinds of DM; type 1 caused by insufficient insulin production and the second due to respond to the target cell to insulin. hyperglycemia condition made the organ target become damaged in long-term conditions. Since 1980 according to WHO global

report on Diabetes shown almost quadrupled of adult living with diabetes and the numbers increasing to 244 million in 2014. Diabetes with type 2 caused by overweight and obesity is the reason why the number become increasing of that year [1].

The extract from some of the medicinal plants which have the same biologically activity was prepared according to the ayurvedic preparation, and for the reason of the marketing project, this sample was prepared in bulk dosage form. Base on the reason above, the aims of this study is to find out the plants which have the potential effect as an anti-hyperglycemic. The plants that have been tested as anti-hyperglycemia are cat root leaves (*Acalypha indica*), maja leaves (*Crescentia cujete* L.), and alang-alang plants (*Imperata cylindrica*).

2. Experimental

2.1 *Preparation of herbal extracts*

The above-said herbs were selected and procured from the approved supplier. They were washed with water and then powdered. The powder was taken, and extraction was carried out in a large-scale capacity reactor using 75% methanol and concentrated. The concentrated extract was spray dried, and the dried powder was taken to check the antioxidant activity.

2.2 *Animal pre-treatment*

For evaluated the diabetes effect, Mice were induced alloxan monohydrate, and the dose was used is 120 mg/kg via intraperitoneal. The rats were observed during 7 days with food and water supply. For measuring the blood glucose, on the 8th day, the mice were fasting for 12 hours, and their blood was taken. One Touch Glucometer [2] was used to test their blood glucose level and Mice with the glucose level of about 120 mg/dl as a standard.

2.3 *Treatment protocol*

The diabetic mice were randomly divided into five groups (n = 6/groups. There are four group of mice as a sample. Group A as control, diabetic group (B), and (C), (D), and (E) group were a diabetic group with extract of *Crescentia cujete* L. leaves, *Imperata cylindrica* plant, and *Acalypha indica* leaves a dose of 500 mg/kgBW in aqueous solution orally for 14 days. The protocol was repeated for methanol extract on the same dosage. For the examined the effect of glycemic, The extract was applied to the normal glycemic rat. For the examined the effect of glycemic, The extract was applied to the normal glycemic mice and further observed.

2.4 *Analysis hyperglycemic levels*

Hyperglycemic blood data was taken on day 9 via the tail vein of the mice followed day 23 as treatments data. analysis glucose level on the blood was determined using One Touch Glucometer [2].

3. Results and discussion

Table 1 shows that there was an elevation in blood glucose levels in alloxan-treated diabetic mice when compared with normal mice. The intraperitoneal injection of alloxan in mice produced hyperglycemia impaired glucose tolerance and insulin resistance. Among the administration of the extracts of *Crescentia cujete* L. leaves, *Imperata cylindrica* plant, and *Acalypha indica* leaves, only Acalypha indica leaves extracts to bring the fasting blood glucose level towards the normal in the acute study (Table 1).

The average value of glucose levels in the first stage after glucose feeding showed that the normal group (96.225±6.345 mg/dL) was significantly different for all treatment groups, whereas in the hyperglycemia group (166.404b±11.341mg/dL) it was not significantly different from *Crescentia cujete* L., *Imperata cylindrica*, and *Acalypha indica* extract with dose of 500 mg/kgBW. The table shows that the average value of the lowest glucose level was in the normal group of 96.225±6.345

mg/dL while the average value of the highest glucose level was 195.641±12.543 mg/dL in the C group (Table 1). Statistical analysis also showed a significant difference between groups ($p<0.05$).

Table 1. Average glucose levels of mice at the first measurement and second measurement

No	Treatment	Average blood glucose level (mg / dL) male mice	
		Stage I	Stage II
1	Normal Control A	96.225a ± 6.345	95.881a ± 5.982
2	Diabetic Control B	166.404b ± 11.341	241.203c ± 16.892
3	Diabetic + *Crescentia cujete* L. leaf extract (C)	195.641b ± 12.543	107.478ab ± 5.781
4	Diabetic + *Imperata cylindrica* plant extract (D)	165.230b ± 12.022	113.403ab ± 5.153
5	Diabetic + *Acalypha indica* leaf extract (E)	183.602b ± 13.651	96.80a ± 4.950

The average second stage glucose level after administration of treatment showed that in the normal group (95.881±5.982 mg/dL) the effect was not significantly different from *Crescentia cujete* L. (107.478±5.781 mg/dL), *Imperata cylindrica* (113.403±5.153 mg/dL), and *Acalypha indica* (96.80±4.950 mg/dL) extract with dose of 500 mg/kgBW, whereas in the hyperglycemia group (241.203±16.892 mg/dL) had a very significant different effect on the three treatments. The average value of the lowest glucose level is in the normal group, which is equal to (95.881±5.982 mg/dL) while the average value of the highest glucose is in the hyperglycemia group at (241.203±16.892 mg/dL). *Acalypha indica* leaf (96.80±4.950 mg/dL) extract showed better glucose levels than the extract of *Crescentia cujete* L. leaf (107.478±5.781 mg/dL) and *Imperata cylindrical* plant (113.403±5.153 mg/dL).

Diabetes as the second leading metabolic disease in the world and information on the diversity of the caused of the disease increase by the time, so the needed for more challenging and appropriated therapies. Both insulin and glucagon, pancreatic endocrine hormones, are responsible for controlling blood-glucose level within the body at an adequate level based on the body needs. Normally, insulin is secreted by the β-cells found at the islets of Langerhans in response to high levels of blood sugar. It potentiates the ability of muscle, red blood cells, and fat cells to absorb sugar out of the blood and consume it in other metabolic processes, which restore the sugar levels to the normal level [3].

Natural products are the major mine for discovering promising lead candidates, which play an important role in future drug development programs. Ease of availability, least side effects, and low cost make the herbal preparations are the main key player of all available therapies, especially in rural areas [4]. Since centuries, many plants are considered a fundamental source of potent anti-diabetic drugs. Although, synthetic oral hypoglycemics together with insulin are the main route for controlling diabetes. However, they exhibited prominent side effects and failed to reverse the course of its complications. This constitutes the major force for finding alternatives, mainly from plant kingdom that is of less severe or even no side effects [5].

The data shows that all plants extract have the effect of decreasing glucose level in rats. Alloxan treatment was applied to induce free radical reaction and made injured in tissue cell and the activity of pancreas more sensitive of alloxan-induced free radical damage. Alloxan, a β-cytotoxin, causes massive destruction of β-cells of the islets of Langherhans, resulting in reduced synthesis and release of insulin.

All plant samples used contain secondary metabolites such as alkaloids, saponins, triterpenes, flavonoids, triterpenoids/steroid and tannins found in *Crescentia cujete* L., *Acalypha indica*, and *Imperata cylindrical* [6][7][8]. In general, the chemical content of the plant comprises citric acid, crescentic acid, tartaric acids, tannins, β-sitosterol, stigmasterol, α- and β-amyrin, stearic acid,triacontanol, palmitic acid, flavonoids (quercetin, apigenin), 3-hydroxyoctanol glycosides and phydroxybenzoyloxyglucose [9]. These compounds have diverse structures and show a variety of biological activities that are very useful.

Base on the result of diabetes test in the animal showed deeply information about physiological and biochemical derangement of the diabetic state. Many of these derangements have been characterized in hyperglycemic animals. Treatment for diabetes patients by using traditional plant has been used since ancient era. The traditional plant has been using for treating diabetes throughout the world since long time ago, and herbal formulations are frequently considered to be less toxic and free from side effects than synthetic ones.

In general, specific treatment for diabetes patients still unclear, but some of the compounds from the plant such as glycosides, alkaloids, terpenoids, flavonoids, etc. trusted precisely for cure diabetic disease without any side effect. Furthermore, as an alternative medicine finding the best treatment from the plants for cure diabetes still heading in progress even for that, there is challenging not only for the doctor but also for some of the researcher in the world [10].

Conclusion

Plants have been reported to possess secondary metabolites with antidiabetic potential. This review insighted the activity of various medicinal plants in managing diabetes mellitus in experimental animals. *Acalypha indica* leaf extract showed better glucose levels than the extract of *Crescentia cujete* L. leaf and *Imperata cylindrical* plant.

References

[1] J. Karthikeyan, V. Kavitha, T. Abirami, and G. Bavani, "Medicinal plants and diabetes mellitus: A review," J. Pharmacogn. Phytochem., vol. 6, no. 4, pp. 1270–1279, 2017.
[2] G. Johnson, "Clinical lecture on the various modes of testing for sugar in the urine," Br. Med. J., vol. 1, no. 1201, p. 1, 1884.
[3] P. Das Gupta and A. De, "Diabetes mellitus and its herbal treatment," Int. J. Res. Pharm. Biomed. Sci., vol. 3, no. 2, pp. 706–721, 2012.
[4] R. Sharma and V. Arya, "A review on fruits having anti-diabetic potential," J. Chem. Pharm. Res., vol. 3, no. 2, pp. 204–212, 2011.
[5] M. U. Rao, M. Sreenivasulu, B. Chengaiah, K. J. Reddy, and C. M. Chetty, "Herbal medicines for diabetes mellitus: a review," Int J PharmTech Res, vol. 2, no. 3, pp. 1883–1892, 2010.
[6] B. C. Ejelonu, A. A. Lasisi, A. G. Olaremu, and O. C. Ejelonu, "The chemical constituents of calabash (Crescentia cujete)," African J. Biotechnol., vol. 10, no. 84, pp. 19631–19636, 2011.
[7] H. S. KIROM and Z. M. Ramadhania, "AKTIVITAS BIOLOGIS TANAMAN KUCING KUCINGAN (Acalypha indica L)," Farmaka, vol. 15, no. 3, pp. 162–169, 2017.
[8] S. Seniwaty, R. Raihanah, I. K. Nugraheni, and D. Umaningrum, "Skrining fitokimia dari alang-alang (Imperata cylindrica L. Beauv) dan lidah ular (Hedyotis corymbosa L. Lamk)," J. Sains dan Terap. Kim., vol. 3, no. 2, pp. 124–133, 2016.
[9] N. Das, M. E. Islam, N. Jahan, M. S. Islam, A. Khan, M. R. Islam, and M. S. Parvin, "Antioxidant activities of ethanol extracts and fractions of Crescentia cujete leaves and stem bark and the involvement of phenolic compounds," BMC Complement. Altern. Med., vol. 14, no. 1, p. 45, 2014.
[10] N. Malviya, S. Jain, and S. Malviya, "Antidiabetic potential of medicinal plants," Acta Pol Pharm, vol. 67, no. 2, pp. 113–118, 2010.

Drh._Dwi_Prosiding.pdf

ORIGINALITY REPORT

%20	%14	%6	%11
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	www.ijbio.com Internet Source	%5
2	www.ncbi.nlm.nih.gov Internet Source	%3
3	A. D. Sathisha, H. B. Lingaraju, K. Sham Prasad. "Evaluation of Antioxidant Activity of Medicinal Plant Extracts Produced for Commercial Purpose", E-Journal of Chemistry, 2011 Publication	%3
4	jocpr.com Internet Source	%2
5	www.phytojournal.com Internet Source	%1
6	scialert.net Internet Source	%1
7	M. Mohamed Essa, P. Subramanian. " Protective Role of Leaf Extract on Tissue Antioxidant Status and Lipid Peroxidation in	%1

Ammonium Chloride-Induced Hyperammonemic Rats ", Toxicology Mechanisms and Methods, 2008
Publication

8	Vaiyapuri Sivajothi. "Antihyperglycemic Property of *Tragia cannabina* in Streptozotocin-Induced Diabetic Rats", Journal of Medicinal Food, 06/2007 Publication	%1
9	Submitted to Federal University of Technology Student Paper	<%1
10	d-nb.info Internet Source	<%1
11	Submitted to Fanshawe College of Applied Arts and Technology Student Paper	<%1
12	ijpsr.com Internet Source	<%1
13	Submitted to Manchester Metropolitan University Student Paper	<%1
14	Yaschilal Muche Belayneh, Eshetie Melese Birru. " Antidiabetic Activities of Hydromethanolic Leaf Extract of (Ait.) Benth. Subspecies (Fabaceae) in Mice ", Evidence-Based Complementary and Alternative	<%1

Medicine, 2018

Publication

EXCLUDE QUOTES	ON	EXCLUDE MATCHES	< 5 WORDS
EXCLUDE BIBLIOGRAPHY	ON		