

HYPOGLYCEMIC ACTIVITY OF ETHANOLIC EXTRACT OF *SAURAUIA VULCANI* KORTH. LEAVESPanal Sitorus^{1*}, Rosidah², Denny Satria¹¹Department of Pharmaceutical Biology, Faculty of Pharmacy, Universitas Sumatera Utara, Medan, Indonesia, ²Department of Pharmacology, Faculty of Pharmacy, Universitas Sumatera Utara, Medan, Indonesia. Email: sitoruspanal@gmail.com

Received: 07 March 2018, Revised and Accepted: 25 March 2018

ABSTRACT

Objective: The aim of this study was to investigate the hypoglycemic activity of ethanol extract of *Saurauia vulcani* Korth. leaves.**Methods:** *S. vulcani* Korth. leaf powder was extracted by maceration method with ethanol 96%. Hypoglycemic activity was examined on rats which is induced with streptozotocin 40 mg/Kg body weight (BW) at dose of 50; 100; and 200 mg/Kg BW.**Results:** Hypoglycemic activity of the extract in diabetic rats showed a significant reduction in blood glucose levels ($p < 0.001$) at dosage 50 mg/Kg BW.**Conclusion:** The results reveal that ethanol extract of *S. vulcani* Korth. leaves has hypoglycemic activity. Our further study is to assess mechanism action as antidiabetic.**Keywords:** Hypoglycemic, *Saurauia vulcani* Korth., Leaves, Extract, Ethanol.© 2018 The Authors. Published by Innovare Academic Sciences Pvt Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>) DOI: <http://dx.doi.org/10.22159/ajpcr.2018.v11s1.26561>

INTRODUCTION

The use of medicinal plants in the community is increasing in several decades [1-3]. Indonesia has thousands of islands with various plants in it and the manners of the community using plants as a treatment for diseases traditionally [4,5].

Diabetes mellitus (DM) is a heterogeneous syndrome which all of the symptoms are characterized by increased of blood sugar level that caused relative or absolute insulin activity. DM is divided by the need for insulin, i.e., insulin diabetes dependent DM (IDDM) called Type 1, and non-IDDM called Type 2. DM is dangerous degenerative disease, even considered as a high-risk disease because it can cause death [6].

Saurauia vulcani Korth. is one of the plants which used as antidiabetic traditionally in Tapanuli Utara, North Sumatera, Indonesia. Ethanolic extract of *S. vulcani* Korth. leaves can reduce blood glucose level (BGL) in mice which induced by glucose 50% and alloxan at dose 200 mg/Kg body weight (BW) [7,8]. The purpose of this study was assessed the hypoglycemic activity of ethanol extract of *S. vulcani* Korth. leaves toward rats which induced by streptozotocin (STZ).

METHODS

Plant and chemicals material

The materials used in this study were *S. vulcani* Korth. leaves were taken from Tarutung, North Sumatera, Indonesia. The chemicals used are pro-analysis grade: STZ (Nacalai), carboxymethylcellulose (CMC) Na (Merck), and technical grade of ethanol and distilled water.

Preparation of extract

The air-dried and powdered leaves of *S. vulcani* Korth. (1 kg) were extracted by cold maceration with ethanol 96% (3×3 d, 10 L) at room temperature on a shake. The filtrate was collected and then evaporated under reduced pressure to give a viscous extract and then freeze-dried to give a dried extract [2,9].

Antidiabetic assay

Animal preparation

The animals used in this study were male rats weighing 180–200 g. Before the experiment, rats were maintained for 2 weeks in a good cage

to match the environment, i.e., the reception of light, 12 h dark, and 12 h light.

Preparation of extract suspension and STZ solution

Suspension of the extract was prepared using 0.5% CMC-Na with certain concentration. Solution of STZ was prepared by dissolving STZ in aqua bidest.

Preparation of STZ induced diabetic rat

The rat was induced with STZ solution 40 mg/Kg intra-peritoneal. The BGL of the rat was measured on the 3rd day. On the 3rd day, rats that has BGL higher than 200 mg/dl were separated and used as test animals. Animals with BGL lower than 200 mg/dL, were induced back with STZ. If on the 3rd day, the BGL of the rat has been higher than 200 mg/dL, the animal was ready to be tested.

Study of the antidiabetic effect of ethanol extract of *S. vulcani* Korth. leaves was conducted using STZ induced diabetic rats by a single dose of ethanol extract. Rats were divided into five groups and each group consisting of 5 rats, they were:

- Group I: Diabetes rats were given suspension of 0.5% CMC, dose 1% of BW
- Group II: Diabetic rats were given suspension of metformin with dose 65 mg/Kg BW
- Groups III, IV, and V: Diabetic rats were given a suspension of ethanol extract of *S. vulcani* Korth. leaves with dose 50, 100, and 200 mg/Kg BW.

Suspension of test material (ethanol extract) was administered every day orally, and the BGL of the rat was measured on the 1st, 3rd, 5th, 7th, 9th, 11th, 13th, and 15th days after administration of the test material [10].

Statistical analysis

All data were analyzed with ANOVA using SPSS 21.

RESULTS AND DISCUSSION

Antidiabetic effect of ethanol extract of *S. vulcani* Korth. leaves with dose 50, 100, and 200 mg/kg BW is shown in Fig. 1.

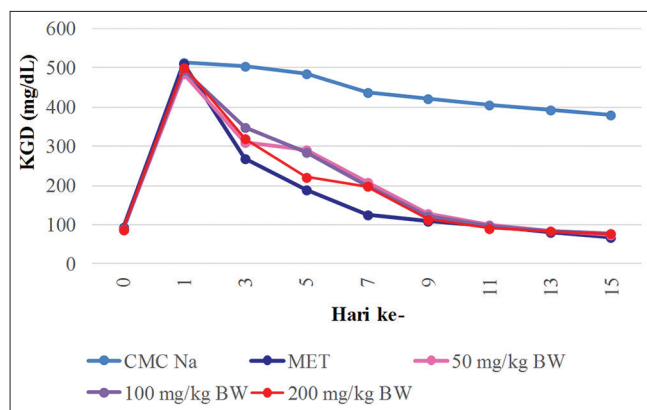


Fig. 1: Effect of treatments to the blood glucose level in streptozotocin-diabetic rat

STZ has been shown to cause direct irreversible damage to β -cells of the pancreatic islet of Langerhans, resulting in degranulation and loss of insulin secretion. Clarification of the regenerating potential in experimentally-induced diabetic animals would be of interest as an alternative therapy for diabetes [11].

Preliminary phytochemical analysis of the ethanol extract of *S. vulcani* Korth. leaves was shown flavonoids, steroids/triterpenoids, tannins, glycosides, and saponins. Flavonoids, glycosides, and saponins have been found to be responsible for blood glucose lowering activity through increased insulin secretion, as evidenced in our experiment by STZ-induced diabetic rats, which is capable of modulating pancreatic secretion [12,13].

CONCLUSION

The result of this study showed that ethanol extract of *S. vulcani* Korth. leaves possess antidiabetic activity.

ACKNOWLEDGMENTS

We gratefully thank to Research Center University of Sumatera Utara through Hibah Talenta "Hibah Penelitian Dasar" Research Grant 2017

"No: 5338/UN5.1.R/PPM/2017" for financial support in the study.

REFERENCES

- Nugroho AE, Adam H, Dyaningtyas DP, Anindya N, Edy M. Combinational effects of hexane insoluble fraction of *Ficus septica* Burm. F. and doxorubicin chemotherapy on T47D breast cancer cells. *Asian Pac J Trop Biomed* 2013;3:297-302.
- Satria D, Furqan M, Hadisahputra S, Rosidah. Combinational effects of ethylacetate extract of *Picria fel-terrae* Lour and doxorubicin on T47D breast cancer cells. *Int J Pharm Pharm Sci* 2015;7:73.
- Mikail CN, Hearney E, Nemesure B. Increasing physician awareness of the common uses and contraindications of herbal medicines: Utility of a case-based tutorial for residents. *J Altern Complement Med* 2003;9:571-6.
- Wasita H. *Obat Tradisional Kekayaan Indonesia*. Yogyakarta: Graha Ilmu; 2011. p. 2-4.
- Anggraeni R, Hadisahputra S, Silalahi J, Satria D. Combinational effects of ethylacetate extract of *Zanthoxylum acanthopodium* DC. with doxorubicin on T47D breast cancer cells. *Int J PharmTech Res* 2014;6:2033.
- Kirana H, Srinivasan BP. *Trichosanthes cucumerina* linn. Improves glucose tolerance and tissue glycogen in non insulin dependent diabetes mellitus induced rats. *Indian J Pharmacol* 2008;40:103-6.
- Sormin N, Panal S, dan Matheus TS. Effect of ethanol extract and n-Hexane, ethylacetate, ethanol Fractions of Pirdot Leaves (*Saurauia vulcani* Korth.) towards Blood Glucose Level of Mice with Tolerance Glucose Method. Thesis. Medan: Faculty of Pharmacy USU; 2014.
- Sitorus P. Characterization simplisia and ethanolic extract of Pirdot (*Saurauia vulcani*, Korth) leaves and study of antidiabetic effect in alloxan induced diabetic mice. *Int J ChemTech Res* 2015;8:789-94.
- Hasibuan PA, Chrestella J, Satria D. Combination effect of ethylacetate extracts of *Plectranthus amboinicus* (Lour). spreng. With doxorubicin against T47D breast cancer cells. *Int J Pharm Pharm Sci* 2015;7:156-9.
- Daud N, Rosidah, Nasution MP. Antidiabetic activity of *Ipomoea batatas* L. leaves extract in streptozotocin-induced diabetic mice. *Int J PharmTech Res* 2016;9:167-70.
- Risbud MV, Bhone RR. Models of pancreatic regeneration in diabetes. *Diabetes Res Clin Pract* 2002;58:155-65.
- Chattopadhyay RR. Possible mechanism of antihyperglycaemic effect of *Azadiracta indica* leaf extract. *J Ethnopharmacol* 1999;67:373-6.
- Masayuki Y, Hiromi S, Norihisa N, Yuhao L, Iwao T, Johji Y, et al. Antidiabetic principles of natural medicines II. Aldose reductase and α -glukosidaseinhibitors from brazilian natural medicine. *Bio Pharm Bull* 1998;24:113-9.