

Indonesian plants with potential as an anti-diabetes mellitus agent

by Nita Parisa

Submission date: 08-Feb-2022 08:26AM (UTC+0700)

Submission ID: 1757311113

File name: 7-Article_Text-52-1-10-20201123_1.pdf (474.16K)

Word count: 1909

Character count: 10697



Indonesian plants with potential as an anti-diabetes mellitus agent

Rachmat Hidayat^{1*}, Lusya Hayati¹, Nita Parisa²

¹Department of Biology, Faculty of Medicine, Universitas Sriwijaya

²Department of Pharmacology, Faculty of Medicine, Universitas Sriwijaya

ARTICLE INFO

Keywords:

Antihyperglycemia
Diabetes mellitus
Flavonoids

Corresponding author:

Rachmat Hidayat

E-mail address:

dr.rachmat.hidayat@gmail.com

All authors have reviewed and approved the final version of the manuscript.

<https://doi.org/10.37275/EHI.v1i2.7>

ABSTRACT

Diabetes Mellitus (DM) is a degenerative disease that continues to increase in number in Indonesia and is a disease that is spread throughout the world due to unbalanced nutritional conditions. Treatment of diabetes mellitus is a chronic and lifelong treatment. Treatment of diabetes mellitus, such as the use of insulin and oral antihyperglycemia drugs, is relatively expensive, is used for a long time and can cause unwanted side effects. There are many plants that have potential as antihyperglycemia drugs. One of the active compounds that act as antihyperglycemia is flavonoids. Flavonoids derived from various types of plants studied are thought to act as antihyperglycemic agents. Flavonoids are known to have the ability to scavenge free radicals or act as natural antioxidants. The antioxidant activity of flavonoids is related to phenolic -OH group which can capture or neutralize free radicals (such as ROS or RNS). Flavonoids can play a role in pancreatic tissue damage caused by DNA alkylation due to alloxan induction as a result of improving the morphology of the rat pancreas (Prameswari and Widjanarko, 2014).

1. Introduction

Diabetes mellitus is a collection of various kinds of syndromes characterized by increased blood sugar levels (hyperglycemia), changes in fat, carbohydrate and protein metabolism and an increased risk of complications of cardiovascular disease (Arokiyaraj et al, 2011). Diabetes mellitus (DM) is a degenerative disease that continues to increase in number in Indonesia and is a disease that is spread all over the world due to unbalanced nutritional conditions. The prevalence and incidence of Type II Diabetes Mellitus continues to increase in both developed and developing countries (Kaempe et al, 2013). Diabetes mellitus treatment is chronic and lifelong treatment. Treatment of diabetes mellitus, such as the use of insulin and oral antihyperglycemia drugs, is relatively expensive, is used for a long time and can cause unwanted side effects. Therefore, it is necessary to look for effective

drugs with low prices and relatively low side effects, namely herbal medicines derived from plants (Prameswari and Widjanarko, 2014). Thus, it is hoped that this review article can provide information regarding plants that have hyperglycemic activity.

2. Research Methods

The process of searching for article sources was obtained by searching on google, google scholar, and NCBI with the keywords "antihyperglycemia", "antihyperglycemic in rat" and "antihyperglycemia in rats". The primary data sources used are national journals and international journals published during the last 15 years.

3. Results and Discussion

The results of the analysis from various journal sources found the effective dose, the plant parts used,

and the compound content of several plants to provide an antihyperglycemic effect. Secondary metabolites from various plants studied contain antioxidants, namely flavonoids. Flavonoids derived from various kinds of plants studied are thought to act as antihyperglycemic agents. Flavonoids are known to have the ability to scavenge free radicals or act as natural antioxidants. The antioxidant activity of flavonoids is related to phenolic -OH groups which can capture or neutralize free radicals (such as ROS or RNS). Flavonoids can play a role in pancreatic tissue damage caused by DNA alkylation due to alloxan induction as a result of improving the morphology of the rat pancreas (Prameswari and Widjanarko, 2014). Flavonoids are reported to have antidiabetic activity that can regenerate cells on Langerhans islands (Prameswari and Widjanarko, 2014). With the improvement of Langerhans cells, the amount of insulin produced will increase so that blood glucose will enter the cells and a decrease in blood glucose occurs in the body. Flavonoid compounds are one of the antioxidant compounds that are thought to be able to restore the sensitivity of insulin receptors in cells resulting in a decrease in rat blood glucose levels. (Ganugapati, et al. 2012 reported that flavonoids isolated from bananas have the potential to activate insulin receptors on cells and become an alternative choice for the treatment of type II diabetes mellitus patients with insulin resistance. Based on a review of the source of review data obtained, the parameters examined in Antihyperglycemia testing includes testing of blood sugar levels and pancreatic histopathology. Testing of blood sugar levels can be done using the enzymatic method with GOD PAP reagent and can use

a glucometer instrument. Meanwhile, for pancreatic histopathology observation is done by looking at the damage to Langerhans cells using a microscope. used divided into several treatment groups to see differences in results, namely the negative control group, the positive control group and the test group. As a comparison, oral antihyperglycemia drugs were used, one of which was glibenclamide from the sulfonylurea which has a mechanism of action to stimulate insulin secretion (Baroroh et al, 2011). Rats used as experimental animals must first be conditioned hyperglycemia by various induction methods. The usual hyperglycemia induction using alloxan. Alloxan is one of the diabetogenic substances that is toxic, especially to pancreatic beta cells and if given to experimental animals, the experimental animals can become diabetes. The mechanism of damage to pancreatic beta cells by alloxan begins with the oxidation of sulfidre groups and the formation of free radicals. Alloxan reacts with two -SH groups that bind to the sides of the protein or amino acid to form a disulfide bond, thereby inactivating the protein which results in disruption of the protein function. Alloxan induction at a dose of 125 mg / Kg BW intraperitoneally was able to increase glucose levels in rats until they reached a hyperglycemic state with blood glucose levels > 135 mg / Dl (Prameswari and Widjanarko, 2014). In addition to using alloxan, induction of experimental animals to experience hyperglycemia can use streptozosin (STZ) at a dose of 50 mg / Kg BW. Streptozosin has an advantage over alloxan because STZ has selective cytotoxicity to pancreatic beta cells so it is less toxic than alloxan (Raju and Balaraman, 2008).

No	Plant Name	Used Plant Parts	Effective dosage	Compound content
1	<i>Pandanus amaryllifolius</i> (Prameswari and Widjanarko)	Leaf	600 mg/kg BB	Tannins, alkaloids, flavonoids and polyphenols
2	<i>Gardenia augusta</i> , Merr (Baroroh et al, 2011)	Leaf	250 mg/kg BB	flavonoid saponins and polyphenols
3	<i>Peperomia pellucid</i> [L] kunth (Salma et al, 2013)	Herb	40 mg/kg BB	alkaloids essential oil flavonoids phytosterols, cardiac glycosides, tannins and antakuinones (Nwokocho et.al, 2012)
4	<i>Solanum melongena</i> L (Aer Buah et al,	Fruit	100 mg/kg BB	Anthocyanin

	2013)			
5	<i>Syzigium alternifolium</i>	Seed	50 mg/kg BB	Flavonoids and phenols
6	<i>Berberis aristata</i> (Singh and Akar Kakkar, 2009)	Root	250 mg/kg BB	berberine, berbamin and palmatine
7	<i>Catharanthus roseus</i> (Rasineni <i>et al</i> , 2010)	Leaf	100 mg/kg BB	Flavonoids and alkaloids
8	<i>Cuminum cyminum</i> (Jagtap And Patil, 2010)	Seed	600 mg/kg BB	Flavonoids
9	<i>Solanum xanthocarpum</i> (Poongothai <i>et al</i> , 2011)	Leaf	200 mg/kg BB	Phosphorus, nitrogen, potassium, magnesium, manganese, zinc, calcium and sulfur
10	<i>Psidium guajava</i> (Huang <i>et al</i> , 2011)	Fruit	250 mg/kg BB	Polyphenolic compounds such as protocatechuic acid, ferulic acid, kuesetin, guavin B, myrecetin, ellagic acid, gallic acid, apigenin routine and vitamin C
11	<i>Cyclocarya paliurus</i> (Wang <i>et al</i> , 2013)	Leaf	8 g/kg BB	Flavonoids and polysaccharides
12	<i>Tetracera scandens</i> Linn. Merr (Umar <i>et al</i> , 2010)	Leaf	0.26 g/kg BB	Flavonoids 3.5 - diprenylgenistein 6.8 direnylgenistein, derrone and alpinumisoflavones
13	<i>Hypericum perforatum</i> (Arokiyaraj <i>et.al</i> , 2011)	Leaf	200 mg/kg BB	Routine and flavonoids such as quercetin and isoquercetin

4. CONCLUSION

There are many plants that have potential as antihyperglycemia drugs. One of the active compounds that act as antihyperglycemia is

5. REFERENCES

- Aer, B.N., Wullur, A.C., and G. Citraningtyas. 2013. Effect Test of Purple Eggplant Skin Ethanol Extract (*Solanum melongena* L.) on Blood Sugar Levels in Wistar Male White Rats (*Rattus Norvegicus*). *Pharmacon*, 2 (4): 135-141.
- Arokiyaraj, S., R. Balamurugan., and P. Augustian. 2011. Antihyperglycemic Effect Of *Hypericum Perforatum* Ethyl Acetate Extract On Streptozotocin Induced Diabetic Rats. *Asian pacific journal of tropical biomedicine*, 1(5) 386-390.
- Baroroh, F., N. Aznam., And H. Susanti. Test of the Antihyperglycemia Effect of Ethanol Extract of *Kacaping* Leaves (*Gardenia Augusta*, Merr) on Wistar Male White Rats. *Pharmaceutical Scientific Journal*, 1 (1): 43-53.
- Ganugapati, J., A. Baldawa., and S. Lalani. 2012. Molecular Docking Studies Of Bananan flavonoids. Of the 13 plants analyzed from journal sources, *Peperomia pellucida* [L.] Kunth has antihyperglycemic activity.
- Flower Flavonoids As Insulin Receptor Tyrosine Kinase Activators As A Cure For Diabetes Melitus. *Bioinformation*, 8 : 216-220.
- Huang, C.S., M.C. Yin., and L.C. Chiu. 2011. Antihyperglycemi And Antioxidative Potential Of *Psidium Guajava* Fruit In Streptozocin-Induced Diabetic Rats. *Food and chemical toxicology*, 49(9): 2189-2195.
- Jagtap, A.G., and P.B. Patil. 2010. Antihyperglycemic Activity And Inhibition Of Advanced Glycation End Product Formation By *Cuminum cyminum* In Streptozocin Induced Diabetic Rats. *Food and chemical toxicology*, 48 : 2030-2036.
7. Kaempe, H.S., E. Suryanto., And S.E.S.Kawengian. 2013. Potential Phenolic Extract of *Goroho* Banana *Bauh* (*Musa* spp.) Against Blood Sugar White Rat (*Rattus Norvegicus*). *Chem Prog*, 6 (1): 6-9.
- Kasetti, R.B., M.D.Rajasekhar., V.K. Kondeti.,

- S.S. Fatima., E.G.T.Kumar., S.Swapna., B. Ramesh, et al. 2010. Antihyperglycemic And Antihyperlipidemic Activities Of Methanol: Water (4:1) Fraction Isolated From Aqueous Extract Of *Syzygium alternifolium* Seeds In Streptozocin Induced Diabetic Rats. *Food and Chemical Toxicology*, 48. 1078-1084.
9. Poongothai, K., P. Ponnuragan., K.S.Z.Ahmed., B.S.Kumar., dan S.A. Sheriff. 2011. Antihyperglycemic and Antioxidant Effects Of *Solanum xanthocarpum* Leaves (Field Grown & In Vitro Raised) Extracts On Alloxan Induced Diabetic Rats. *Asian Pacific Journal Of Tropical Medicine*, 4(10):778- 785.
 10. Prameswari, O.M., and S.B. Widjanarko. 2014. Test of the Effects of Water from Pandan Wangi Leaves on Decreasing Blood Glucose Levels and Histopathology of Diabetes Mellitus Rats. *Journal of Food and Agroindustry*, 2 (2): 16-27
 11. Raju, K., dan R. Balaraman. 2008. Antidiabetic Mechanism Of Saponins of *Momordica cymbalaria*. *Phcog Mag*, 4(15).
 12. Rasineni, K., R. Bellamkonda., S.R. Singareddy., and S. Desireddy. 2010. Antihyperglycemic Activity of *Catharanthus roseus* Leaf Powder In Streptozotocin- Induced Diabetic Rats. *Pharmacognosy Research*, 2(3):195-201.
 13. Salma, N., J. Paendong., L.I. Momuat., And S. Togubu. 2013. Antihyperglycemia of Suruhan Plant Extract (*Peperomia pellucida* [L.] Kunth) Against Wistar Rats (*Rattus norvegicus* L.) induced by sucrose. *Journal of Scientific Science*, 13 (2): 116-123.
 14. Singh, J., and P. Kakkar. 2009. Antihyperglycemic And Antioxidant Effect Of *Berberis aristata* Root Extract And Its Role In Regulating Carbohydrate Metabolism In Diabetic Rats. *Journal of Ethnopharmacology*, 123(1) : 22-26.
 15. Umar,A., Q.U. Ahmed., B.Y.Muhammad., B.B.S. Dogarai., and S.Zaiton. 2010. Anti-hyperglycemic Activity Of The Leaves of *Tetracera scandens* Linn. Merr (Dilleniaceae) in Alloxan Induced Diabetic Rats. *Journal of Ethnopharmacology*, 131(1) : 140-145.
 16. Wang, Q., C. Jiang., S. Fang., J. Wang., Y. Ji., X. Shang., Y. N, et al. 2013. Antihyperglycemic, Antihyperlipidemic And Antioxidant Effects of Ethanol and Aqueous Extracts of *Cyclocarya paliurus* Leaves In Type 2 Diabetic Rats. *Journal of Ethnopharmacology*, 150(3) : 1119-1127.

Indonesian plants with potential as an anti-diabetes mellitus agent

ORIGINALITY REPORT

4%

SIMILARITY INDEX

0%

INTERNET SOURCES

0%

PUBLICATIONS

4%

STUDENT PAPERS

PRIMARY SOURCES

1

Submitted to Universitas Jambi

Student Paper

4%

Exclude quotes On

Exclude matches < 3%

Exclude bibliography On