HERB FOR DIABETES

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ABSTRACT

Introduction: *Diabetes mellitus is one of the disease of aging attributed to chronic inflammation is characterized by increasing blood glucose levels, usually with increasing free radical that can damage pancreas which can be neutralized by antioxidant. Some medicinal plants, have antioxidant effect and have been used empirically by community for controlling blood sugar in Diabetes patient* ***Objective:*** *to know hypoglycemic effect of water extract of Andrographis paniculata Nees, Morinda citrifolia Linn, Strobilanthes crispus Bl, Aloe vera L, Persea americana Mill, Orthosiphon spicatus Backer, Phaleria macrocarpa (Scheff) Boerl on mice as diabetes animal model* ***Method:*** *The research design was prospective comparative true experimental using complete random design. The method was diabetic test in alloxan (120 mg/kg bwt, i.v) induced Swiss Webster diabetic mice that given the variation herbs water extract with oral administration and glibenclamide as long as 7 days Data measured are blood glucose levels/BGL (mg/ dL) after alloxan induced and after the treatment. Percentage in lowering blood glucose levels data analyzed used ANOVA on ranks continued by Dunnett's Multiple Comparisons,* $\alpha = 0.05$. ***Result:*** *There is lowering BGL after treatment with Andrographis paniculata Nees (29.33%), Morinda citrifolia Linn (15.50%), Strobilanthes crispus Bl (12.50%), Aloe vera L (40.46%), Persea americana Mill (44.44%), Orhtosiphon spicatus Backer (43.34%), Phaleria macrocarpa (Scheff) Boefl (34.51%) that is significantly difference compared to negative control (-1.58%) (p<0,05).* ***Conclusion:*** *Andrographis paniculata Nees, Morinda citrifolia Linn, Strobilanthes crispus Bl, Aloe vera L, Persea americana Mill, Orthosiphon spicatus Backer, Phaleria macrocarpa (Scheff) Boerl have hypoglycemic effect on alloxan induced Swiss Webster mice.*

Key word*: hypoglycemic effect of some medicinal plant, alloxan.*

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TUMBUHAN OBAT UNTUK DIABETES

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ABSTRAK

Pendahuluan: Diabetes melitus merupakan salah satu penyakit penuaan disebabkan oleh peradangan kronis yang ditandai dengan meningkatnya kadar glukosa darah, biasanya dengan peningkatan radikal bebas yang dapat merusak pankreas yang dapat dinetralisir oleh antioksidan. Beberapa tanaman obat, memiliki efek antioksidan dan telah digunakan secara empiris oleh masyarakat untuk mengontrol gula darah pada pasien diabetes **Tujuan:** untuk mengetahui efek hipoglikemik ekstrak air *Andrographis paniculata* Nees, *Morinda citrifolia* Linn, *Strobilanthes crispus* Bl, *Aloe vera* L, *Persea americana* Mill , *Orthosiphon spicatus* Backer, *Phaleria macrocarpa* (Scheff) Boerl pada tikus sebagai model hewan diabetes. **Metode:** Desain penelitian adalah penelitian eksperimental sungguhan dengan rancangan percobaan acak lengkap. Metode uji diabetes aloksan (120 mg / kg BB, IV) pada mencit *Swiss Webster* diabetes yang diberikan berbagai bahan uji, akuades sebagai kontrol negatif dan glibenklamid sebagai kontrol pembanding dengan pemberian oral selama 7 hari Data yang diukur adalah kadar glukosa darah / KGD (mg / dL) setelah diinduksi aloksan dan sesudah perlakuan. Persentase dalam menurunkan kadar glukosa darah data yang dianalisis menggunakan *ANOVA on ranks* dilanjutkan dengan uji lanjut uji beda median metode Dunnett's α = 0,05. **Hasil:** KGD terjadi penurunan setelah perlakuan dengan *Andrographis paniculata* Nees (29.33%), *Morinda citrifolia* Linn (15,50%), *Strobilanthes crispus* Bl (12,50%), *Aloe vera* L (40,46%), *Persea americana* Mill (44,44%), *Orhtosiphon spicatus* Backer (43,34%), *Phaleria macrocarpa* (Scheff) Boefl (34,51%) yang berbeda secara signifikan dibandingkan dengan kontrol negatif (-1,58%) (p <0,05). **Simpulan:** *Andrographis paniculata* Nees, *Morinda citrifolia* Linn, *Strobilanthes crispus* Bl, *Aloe vera* L, *Persea americana* Mill, *Orthosiphon spicatus* Backer, *Phaleria macrocarpa* (Scheff) Boerl memiliki efek hipoglikemik pada diinduksi aloksan mencit *Swiss Webster*.

Kata kunci: efek hipoglikemik dari beberapa tumbuhan obat, aloksan.

INTRODUCTION

Modern theories of aging are generally looked at in two theoretical ways; the damage theories and programmed theories. The damage theories primarily looks at the damage that our cells incur over time. This looks at extrinsic aging which is the aging process compounded by externally caused factors. The programmed theories are primarily concerned with the genetics of how long and how efficient our cells can maintain optimum health. This looks at intrinsic aging which is aging due to the rate of passing time.

The most significant factors contributing to aging is chronic inflammation.[1] As we age, we tend towards a number of identifiable inflammatory diseases. Chronic inflammation damages the cells of our brains, heart, arterial walls, and other body structures. Diabetes mellitus, heart disease, alzheimers, senility, parkinsons, rheumatoid arthritis, psoriasis, prostatitis and stroke are just a few of the diseases of aging attributed to chronic inflammation.

Anti-aging therapy is actually a combination of different therapies used to slow and/or reverse human aging. One of the fastest growing segments of medicine today is anti-aging and longevity medicine. The methods showing scientific promise in slowing the aging process and extending the lifespan in mammals is caloric restriction, decreasing cellular inflammation due to free radicals, exercise and the power behind social relationships. Anti-aging therapies can make a difference in such inflammatory diseases and aging disorders such as: arthritis, dementia depression, diabetes, and excess weight.

One of the reasons inflammation occurs is from a rapid rise in blood sugar, which causes biochemical changes in the cell. Staying away from sugar and high-glycemic (simple) carbohydrates, which the body rapidly converts to sugar, is one of the best ways to decrease inflammation.

Diabetes mellitus is characterized by increasing blood glucose levels, usually with increasing free radical that can damage pancreas which can be neutralized by antioxidant. Some medicinal plants, such as sambiloto leaf (*Andrographis paniculata* Nees), mengkudu fruit (*Morinda citrifolia* Linn), keji beling leaf (*Strobilanthes crispus* Bl), lidah buaya (*Aloe vera* L), avocado sheed (*Persea americana* Mill), kumis kucing (*Orhtosiphon spicatus* Backer), mahkota dewa (*Phaleria macrocarpa* (Scheff) Boefl), have antioxidant effect and have been used empirically by community for controlling blood sugar in Diabetes patient.

The objective of this research is to know hypoglycemic effect of water extract of sambiloto leaf (*Andrographis paniculata* Nees), mengkudu fruit (*Morinda citrifolia* Linn), keji beling leaf (*Strobilanthes crispus* Bl), lidah buaya (*Aloe vera* L), avocado sheed (*Persea americana* Mill), kumis kucing (*Orhtosiphon spicatus* Backer), mahkota dewa (*Phaleria macrocarpa* (Scheff) Boefl) on mice as diabetes animal model

METHOD

The research design was true experimental using complete random design. The method was diabetic test in alloxan single dose (120 mg/kg bwt, i.v) induced *Swiss Webster* diabetic mice, and after 14 days, that given sambiloto leaf (*Andrographis paniculata* Nees) 1.56 g/kgbwt, mengkudu fruit (*Morinda citrifolia* Linn) 1.56 g/kgbwt, keji beling leaf (*Strobilanthes crispus* Bl) 1.56 g/kgbwt, lidah buaya (*Aloe vera* L) 1.56 g/kgbwt, avocado sheed (*Persea americana* Mill) 1.56 g/kgbwt, kumis kucing (*Orhtosiphon spicatus* Backer) 1.56 g/kgbwt, mahkota dewa (*Phaleria macrocarpa* (Scheff) Boefl) 1.56 g/kgbwt, Aquadest as negative control and glibenclamide 0.65 mg/kgBB with oral administration as long as 7 days Data measured are blood glucose levels/BGL (mg/ dL) after alloxan induced and after the treatment. Percentage in lowering blood glucose levels data analyzed used ANOVA on ranks continued by Dunnett's Multiple Comparisons, $\alpha = 0.05$.

RESULT

The fasting blood glucose level after alloxan induction are between 127-495 mg/dL. After seven days treatment, mice blood glucose level were measured and the results is shown in table 1.

Table 1 Decreasing mice blood glucose level before and after treatment.

Treatment Group (n=5)	Fasting blood glucose levels (mg/dl)			Percentage Decrease in blood glucose levels(%)
	After alloxan Induction	After treatment (7 days)	Decrease of blood glucose	
sambiloto leaf	262.60	172.20	90.40	29.33
mengkudu fruit	206.20	188.60	17.60	15.50
keji beling leaf	239.00	203.20	35.80	12.50
lidah buaya	337.00	200.60	136.40	40.46
avocado sheed	241.80	123.60	107.40	44.44
kumis kucing	135.00	110.00	25.00	43.34
mahkota dewa	161.20	104.60	56.60	34.51
Aquadest	346.00	347.40	-1.40	-1.58
Glibenclamide	252.20	120.20	132.00	52.92

The effect of the tested material in decreasing the blood glucose levels (in percentage) were analyzed by ANOVA on ranks and showed a significant difference after treatment minimal of two treatment group ($p < 0.05$). Differences between groups were tested further by Dunnett's Method and the results are shown that all of the treatment group are different with negative control group, with the rank of different is avocado sheed, kumis kucing, lidah buaya, mahkota dewa, sambiloto leaf, keji beling leaf, and mengkudu fruit. All of the treatment are also different with glibenclamide. That's mean the effect of all of the treatment groups are lower than glibenclamide.

DISCUSSION

The non-enzymatic reaction of protein by glucose is called the Maillard reaction.[2] or glycation. Through a series of complex reactions, advanced glycation endproducts (AGEs).[3,4] are eventually generated. The Maillard reaction also occurs between lipids and glucose, which results in glycation of phospholipids in the cell membrane or the organelle under hyperglycemic conditions. These glycated lipids are a causative agent of oxidative stress (lipid peroxidation) or angiogenesis, and are related to exacerbation of chronic diabetic complications.[4,5] One of the factors of hypofunctions of human body is protein denaturation which primarily results from glycation as well as oxidation. It has been reported that AGEs generated through glycation are closely related not only to chronic diabetic complications such as glomerulosclerosis and renal arteriosclerosis.[6-9] but also to neurodegenerative diseases such as Alzheimer disease[10] , as well as skin aging[11-13] and bone aging.[14]

Diabetes in animal model was made by giving alloxan, Alloxan which has the chemical name 2,4,5,6 (IH, 3H) - Pyrimidinetetrone monohydrate with its chemical formula is $C_4H_4N_2O_2$ has high affinity to water and contained in the form of monohydrate (alloxan monohydrate). This component is found by Jesus von Liebig and Friedrich Wohler. Alloxan formed by the oxidation (electron reduction) of uric acid by nitric acid. Alloxan is a strong oxidizing agent. Alloxan used as drugs or substances to induce diabetes in animals in laboratory experiments. Alloxan work on pancreatic beta cells that produce insulin and works selectively to kill these cells. The way it works is because the selective alloxan structure similar to glucose. Beta cells have high efficiency in glucose uptake so that alloxan enters the cell in the same manner as glucose into the beta cell.[15] As mentioned earlier, alloxan is a strong oxidizing agent, and causing damage to the pancreas that can be reduced by giving antioxidants. Antioxidants can repair the pancreas damage resulting in increased secretion of insulin and blood glucose levels returned back to normal. The constituents of sambiloto leaf (*Andrographis paniculata* Nees) such as neoandrographolide, 14-deoxy-11,12-didehydroandrographolide, andrograpanin andrographiside, the constituents of mengkudu fruit (*Morinda citrifolia* Linn) such as scopoletin, octoanoic acid, terpenoids, alkaloids, b-sitosterol, carotene, vitamin A, flavone glycosides, linoleic acid, and rutin, the constituents of keji beling leaf (*Strobilanthes crispus* Bl) such as catechins, alkaloids, caffeine, and tannin, the constituents of lidah buaya (*Aloe vera* L) such as polysaccharide and flavonoid, the constituents of avocado sheed (*Persea americana* Mill) such as persenone A and B, the constituents of kumis kucing (*Orhtosiphon spicatus* Backer) such as flavonoid and diterpene, and the constituents of mahkota dewa (*Phaleria macrocarpa* (Scheff) Boefl) such as flavonoid have antioxidant effect. These antioxidant properties from medicinal plants can reduce the pancreas damage that induced by alloxan in animal model and resulting in increased secretion of insulin. This is evidenced by decreasing levels of blood glucose after treatment. There is lowering BGL after treatment with *Andrographis paniculata* Nees (29.33%), *Morinda citrifolia* Linn (15.50%), *Strobilanthes crispus* Bl (12.50%), *Aloe vera* L (40.46%), *Persea americana* Mill (44.44%), *Orhtosiphon spicatus* Backer (43.34%), *Phaleria macrocarpa* (Scheff) Boefl (34.51%) that is significantly difference compared to negative control (-1.58%) ($p<0,05$), although theirs reduction potential are still low compared to glibenclamide.

CONCLUSION

Andrographis paniculata Nees, *Morinda citrifolia* Linn, *Strobilanthes crispus* Bl, *Aloe vera* L, *Persea americana* Mill, *Orthosiphon spicatus* Backer, *Phaleria macrocarpa* (Scheff) Boerl have hypoglycemic effect on alloxan induced Swiss Webster mice

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