IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

ANTIDIABETIC ACTIVITY OF ETHANOLIC LEAVES EXTRACT OF *LINDERA COMMUNIS HEMSL* IN DEXAMETHASONE AND STREPTOZOCIN INDUCED DIABETIC ANIMAL MODEL

Mohamed Jihad Ev[1]* Rajasekaran.S[2]

1. Department of Pharmacology, Research scholar, Institute of Pharmaceutical sciences and Research centre, Bhagwant University, Sikar Road, Ajmer, Rajasthan, India-305004.
2. Department of Pharmacology, Al-Azhar college of Pharmacy, Thodupuzha, Kerala, India

ABSTRACT:

Dexamethasone provides relief for inflamed areas of the body, however they frequently have negative effects on the Pancreas. This prospective investigation goal was to look and investigate atorvastatin therapy for affected people with diabetes. Male albino adult rats weighing in at 180–200 g were obtained from an animal house. The animals were kept in the animal home of in a typical setting contains and exact conditions to normal laboratory nutrition with profitable diet (pellets) and water was offered to animals through the two ages of the tests. The first one lasted for 4 weeks, and the second one for 8 weeks. The extract of *lindera communis hemsl* were investigated for diabetic activity. Each experimental data point was expressed as the mean SE. The results were examined using one-way analysis of variance (ANOVA). P values of 0.05 or below were considered statistically significant.

Keywords: *lindera communis hemsl, Dexamethasone, STZ,* diabetes.

INTRODUCTION:

Diabetes mellitus is a chronic metabolic disorder, characterized by hyperglycemia resulting from variable interactions of here dietary and environmental factors, defects in insulin secretion, insulin action or both.[1]Today, it is a vulnerable endemic problem all over the globe, affecting carbohydrate, protein, and fat metabolism in addition to damaging liver, kidney, and cells of pancreas.[2]Currently available oral antidiabetic synthetic drugs in the management of diabetes partially can compensate metabolic derangements, but do not necessarily improve the elementary biochemical lesions.[3] *Lindera* is a genus of flowering plants in the family Lauraceae, The species are shrubs and small trees. Throughout history, plant extracts have been used as remedies for several pathological conditions associated with oxidative stress. The secondary metabolites isolated from the plants of the genus Lindera consist of several types of phytochemicals.[4,5]

MATERIALS AND METHODS:

Preparation of plant extracts

The plant *lindera communis hemsl* was collected from Kozhikode district, Kerala, India, during November 2021. The plant was authenticated by taxonomist at the Department of Botany, Calicut university, Kerala, India. A voucher specimen was deposited at the herbarium of the college for future reference. The plant leafs was washed with distilled water and shade dried for two weeks. After drying, the plant material was powdered. Powdered plant material (3 kg) was extracted in Soxhlet apparatus using 9 L of ethanol at [(50–60) °C] and residues of the solvent were removed under reduced pressure. The yield (8.57% w/w) was dried in vacuum desiccator and stored in a refrigerator at 4 °C for further use.

Animals:

Male albino rats weighing (180–200 g) were obtained from the Central Animal House, Loyola College. The experimental protocol was approved by the Institutional Ethical Committee of Loyola College (Reg. No. 267/02/2024/S/CPCSEA). They were housed in ventilated cages and fed with a normal pellet diet (Hindustan lever, Mumbai, India) and water *ad libitum*. The animals were maintained in accordance with the CPCSEA guidelines.

Dexamethasone induced diabetic model[6]

Group 1: Received only 0.9% saline.

Group 2: Dexamethasone sodium phosphate (5 mg/kg, i.p.).

Group 3: Received Glibenclamide (5 mg/kg, p.o.) which served as the reference standard group

Group 4: Treated orally with 200 mg/kg *Lindera communis* + Dexamethasone sodium phosphate (5 mg/kg, i.p.)

Group 5: Treated orally with 400 mg/kg *Lindera communis* + Dexamethasone sodium phosphate (5 mg/kg, i.p.)

All the rats received dexamethasone (5 mg/kg, p.o.) daily for 28 days except group 1 which served as the normal control group. The blood glucose concentrations of the animals were measured at the beginning of the study on day 0 and measurements were repeated on the 7th and 11th day after 1 h post dexamethasone treatment.

Streptozotocin induced diabetic model[7]

Group 1: Received only 0.9% saline.

Group 2: Streptozocin 40mg/Kg I.P+ Metformin 50mg/kg,i.p

Group 3: Low dose of [200mg] plant extract +Streptozotocin 40mg/kg, i.p).

Group 4: High dose of [400mg] plant extract +Streptozotocin 40mg/kg, I.p)

One hour after the test drug administration all the rats received Streptozotocin (40 mg/kg, p.o.) daily for 10 days except group 1 which served as the normal control group. The blood glucose concentrations of the animals were measured at the beginning of the study on day 0 and measurements were repeated on the 7th and 10th day after 1 h post Streptozotocin treatment.

Results and Discussion

Table: 1 Effect of *Lindera communis* and Glibenclamide on blood glucose level in Dexamethasone-induced diabetic rats

Treated groups	Serum glucose levels at weekly intervals mg/dl				
	0 Day	07th Day	14th Day	21st Day	28th Day
Group I	103.33±4.56	103±4	103±4.35	103.67±3.44	105.67±3.56
Group II	98.54±7.45	151±1	152.33±3.52	156.77±5.71	158.46±5.23
Group III	96.56±7.80	164.33±32.49	162±23.02	126.43±33.46	124.96±34.47
Group IV	102±7.56	175.63±99.64	171±67.55	153.9±49.84	130.01±31.27
Group V	114±7.52	162.33±51.82	146±52.06	134.54±3.12	126.45±3.98

All the values are mean ± SEM, n=6, One way Analysis of Variance (ANOVA) followed by Dunetts multiple comparison test, *p< 0.05 and **p<0.01, ***p<0.001 vs. control group and [a]p<0.001, vs normal group.

Table.no.5: Effect of Ethanolic extract of *Lindera communis Hemsl* on fasting serum glucose level (OGTT) in STZ induced diabetic rats

Treated groups	Serum glucose levels at weekly intervals mg/dl				
	0 Day	07th Day	14th Day	21st Day	28th Day
Normal	75.40±0.53	75.17±0.68	78.10±0.27	80.77±0.18	104.3±5.59a
Negative Control (STZ 50mg/kg)	224.0±0.37	225.1±0.36	236.0±0.21a	243.5±0.25a	244.3±5.59a
Standard (Glibenclamide 10mg/kg)	212.9±0.23	223.3±9.17	182.9±10.66*	108.3±0.27**	115.3±3.48**
LC (200mg\kg)	230.8±0.18	223.7±0.70	190.6±15.16*	116.4±0.14**	125.9±1.36**
LC (400mg\kg)	236.0±4.866	224.0±3.342	166.0±3.308**	148.8±11.5***	118.7±4.367***

All the values are mean ± SEM, n=6, One way Analysis of Variance (ANOVA) followed by Dunetts multiple comparison test, *p< 0.05 and **p<0.01, ***p<0.001 vs. control group and [a]p<0.001, vs normal group.

Dexamethasone is a long-acting glucocorticoid with t½ more than 36 hours. According to a study, transgenic mice producing excess of 11–beta HSD develop typical features of the metabolic syndrome, suggesting that excess of cortisol in tissues might be responsible for the insulin resistance, a core feature of type 2 diabetes mellitus. Dexamethasone produces dose-dependent inhibition of insulin release caused by glucose, tolbutamide and other insulin releasers.[8]Therefore, only insulin sensitizers and insulin are likely to be effective in dexamethasone-induced hyperglycemia. Insulin sensitizers like Rosiglitazone and metformin are being evaluated for primary prevention of type 2 diabetes mellitus in high-risk patients.[9]

STZ induced diabetic rats are one of the animal models of type 1 diabetes mellitus.[10] It is well known for its selective pancreatic islet beta cell cytotoxicity and has been extensively used to induce type 1 diabetes in experimental rat model. Glibenclamide is often used as a standard antidiabetic drug in STZ induced diabetes to compare the efficacy of variety of hypoglycemic drugs.[11]

The present study is the preliminary assessment of the antidiabetic activity of the ethanolic extract of *Lindera communis*. The extracts showed a dose-dependent fall in FBG in STZ induced diabetic rats. STZ induced diabetes by pancreatic cell damage mediated through generation of cytotoxic oxygen free radicals. The primary target of these radicals is the DNA of pancreatic cells causing DNA fragmentation.

When Ethanolic extract of *Lindera communis Hemsl* extracts were administered to glucose loaded normal rats (OGTT) fasted for 18 hours, reduction in blood glucose levels was observed after 2 hr. The decline reached its maximum at 24 h. In our study, the difference observed between the initial and final fasting blood glucose levels of different groups under investigation revealed a significant elevation in blood glucose in diabetic control group at the end of the 28days experimental period. Administration of extracts to diabetic rats showed a significant decrease in the fasting blood glucose and an increase in the serum insulin levels. Hence, the possible mechanism by which Ethanolic extract of *Lindera communis* brings about its hypoglycemic action may be by potentiating the insulin effects of plasma by increasing either the pancreatic secretion of insulin from the existing beta cells or by its release from the bound form.

Another possible mechanism may be attributed to the rich fiber content of Ethanolic extract of *Lindera communis*. Dietary fibers play a major role in lowering the blood glucose level by slowing the rate of carbohydrate absorption from intestine and are hence beneficial for diabetics, especially type II diabetics.[12,13]

Conclusion

The leaves of *Lindera communis Hemsl* reduced the fasting and postprandial blood sugar levels, bringing them down towards normal, in dexamethasone and STZ induced hyperglycemia in rats. Reduction in the fasting and the postprandial blood sugar levels with leaves of insulin plant was comparable with that obtained with negative control of powdered leaves of the *Lindera communis Hemsl*

References

1. Soumya D., Srilatha B. Late stage complications of diabetes and insulin resistance. J. Diabetes Metab. 2011; 2:1000167.

2. Arumugam G., Manjula P., Paari N. A review: Anti diabetic medicinal plants used for diabetes mellitus. J. Acute Dis. 2013; 2:196–200. doi: 10.1016/S2221-6189(13)60126-2.

3. Murea M., Ma L., Freedman B.I. Genetic and environmental factors associated with type 2 diabetes and diabetic vascular complications. Rev. Diabet. Stud. 2012; 9:6–22. doi: 10.1900/RDS.2012.9.6.

Wofford, B.E. A new Lindera (Lauraceae) from North. America. J. Arnold Arbor. 1983, 64, 325–331.

4. Kim, J.A.; Jung, Y.S.; Kim, M.Y.; Yang, S.Y.; Lee, S.; Kim, Y.H. Protective effect of components isolated from Lindera erythrocarpa against oxidative stress-induced Apoptosis of H9c2 Cardiomyocytes. Phytother. Res. 2011, 25, 1612–1617.Plants 2020, 9, 1765 20 of 22

5. Wang, J.; Wang, F.; Yuan, L.; Wu, Y.; Peng, X.; Kai, G.; Liu, Y. Aqueous extracts of Lindera aggregate (Sims) Kosterm leaves regulate serum/hepatic lipid and liver function in normal and hypercholesterolemic mice. J. Pharmacol. Sci. 2020, 143, 45–51.

6. Mahendran P, Devi CS. Effect of *Garcinia cambogia* extract on lipids and lipoprotein composition in dexamethasone administered rats. *Indian J Physiol Pharmacol.* 2001;45:345–50.

7. Aslan M, Orhan DD, Orhan N, Sezik E, Yesilada E. *In vivo* antidiabetic and antioxidant potential of *Helichrysum plicatum* ssp. plicatum capitulums in streptozotocin induced diabetic rats. *J Ethnopharmacol.* 2007;109:54–59.

8. Lambillotte C, Gilon P, Henquin JC. Direct glucocorticoid inhibition of insulin secretion: An *in vitro* study of dexamethasone effects in mouse islets. *J Clin Invest.* 1997;99:414–23.

9. Sathyaprakash R, Henry RR. Preventing diabetes by treating aspects of the metabolic syndrome. *Curr Diab Rep.* 2002;2:416–22.

10. Tomlison KC, Gardiner SM, Hebden RA. Functional consequences of streptozotocin induced diabetes mellitus, with particular reference to the cardiovascular system. *Pharmacol Rev.* 1992;44:103–150.

11. Fernandes N, Lagishetty CV, Panda VS, Naik SR. An experimental evaluation of the antidiabetic and antilipidemic properties of a standardized *Momordica charantia* fruit extract. *BMC Complement Altern Med.* 2007;7:29.

12. Pareek H, Sharma S, Khajja BS, Jain K, Jain GC. Evaluation of hypoglycemic and anti-hyperglycemic potential of *Tridax procumbens* (Linn.) *BMC Complement Altern Med.* 2009;9:48.

13. Jiaa Q, Liub X, Wua X, Wanga R, Hua X, Lia Y, et al. Hypoglycemic activity of a polyphenolic oligomer-rich extract of *Cinnamomum parthenoxyl* bark in normal and streptozotocin induced diabetic rats. *Phytomedicine.* 2009;16:744–750.