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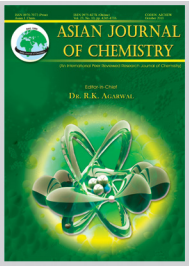

NOTE

Antidiabetic Activity of Various Leafy Extracts of *Smilax zeylanica* Linn in Streptozotocin Induced Diabetic Rats

PRABHAT KUMAR JENA[1,*], SUBAS CHANDRA DINDA[1] and P. ELLAIAH[2]

[1]Department of Pharmaceutical Technology, School of Pharmaceutical Education and Research, Berhampur University, Bhanja Bihar, Berhampur-760 007, India
[2]Department of Pharmaceutical Technology, Jeypore College of Pharmacy, Rondapalli, Jeypore-764 002, India

*Corresponding author: E-mail: pravat_kumar_jena@yahoo.co.in

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Smilax zeylanica Linn is found in the tribal area of Baipariguda (Dist: Koraput) Odisha, India and extensively used traditionally by the tribal people as anthelmintic, antibacterial, analgesic, impotency and antifungal agent. The present study involves the antidiabetic activity of different extracts of leaves of plant *S. zeylanica* using petroleum ether, ethyl acetate, *n*-butanol and ethanol as solvents. The various doses of solvents extracts were evaluated for their antidiabetic activity on Wister rat. All extracts exhibited the antidiabetic activity at 250 mg/kg concentration and the activities were well comparable with the standard drug, glibenclamide. Among all the solvent extracts, ethanolic extract showed better antidiabetic activity. The data were verified as statistically significant by using one way ANOVA at 5 % level of significance ($p < 0.05$).

Key Words: *Smilax zeylanica*, Antidiabetic, Streptozotocin, Glucometer.

Smilax zeylanica Linn (Smilacaceae) commonly known as Jangliashbha (Hindi) is widely distributed in Indian forests. It is a brambled, woody vine that grows up to 50 m long. It produces small flowers and black, blue, or red berry-like fruits, which are eaten frequently by birds[1]. Plants flower in May and June with white/green clustered flowers. If pollination occurs, the plant will produce a bright red to blue-black spherical berry fruit about 5-10 mm in diameter that matures in the fall[2,3].

Antidiabetics are defined as the substances, which lower blood sugar, called hypoglycemic agents, used to treat diabetic mellitus. Diabetic mellitus is characterized by persistent hyperglycemia. The different factors involved like hereditary, immunological, age stress *etc.*, during which either endogenous insulin secretion is reduced or action of insulin is opposed[4]. The present study is an attempt to evaluate the antidiabetic activity of *Smilax zeylanica* Linn.

The literature survey reveals that various parts of *S. zeylanica* have been used as a folklore medicine for curing various ailments like veneral diseases (root and plant); impotency, analgesic and anthelmintic activity (leaf); as a carminative and in dropsy (plant), for relief in burning sensation in the feet accompanied by vesicular watery eruptions (plant)[5]. This prompted us to investigate the antidiabetic activity of solvent extracts of *S. zeylanica* leaves.

Sonicator, heating mantle, soxhlet extractor, orally feeding needle, dispovan syringe, insulin syringe, digital glucometer (Jonan and Jonsib), glucose strip and standard drug glibenclamide were supplied by the department of pharmacognosy, Jeypore College of Pharmacy, Rondapalli, Jeypore. All other chemicals and reagents were procured from authorized suppliers and were of analytical grades.

Plant material: The leaves of *S. zeylanica* Linn were collected from local area of Baipariguda (Dt. Koraput) in the month of July-August, 2009. The plant was identified and authenticated by the Biju Pattnayak Medicinal Plants Garden and Research Centre, Dr. M.S. Swami Nathan Research Foundation, Jeypore, Koraput (District), Odisha, India (Letter no. MJO8/DBT/575, date, 03.12.2008). The leaves were shade dried under normal environmental condition. The dried leaves were powered and stored in a closed container for further use.

Preparation of extract: In the extraction procedure, a total amount of 1.5 Kg dried leaves were made coarse powder and were extracted with each solvent (petroleum ether, ethyl acetate, *n*-butanol and ethanol) by using soxhlet apparatus. For each solvent, 50 cycles were run. Each extract was filtered and concentrated by distilling the solvent to obtain the crude extract. Then each crude extract was dried by rotary evaporator. The successive solvent extraction of leaves of

TABLE-1
ANTIDIABETIC ACTIVITY OF VARIOUS LEAFY EXTRACTS OF *Smilax zeylanica Linn*

Group	Treatment Dose (mg/Kg)		Blood glucose (mg/dl) (X ± SEM)			
			Basal value	1 h	3 h	6 h
I	Control (Distilled water)		76.16 ± 1.99	81.16 ± 2.23	81.17 ± 2.15	80.8 ± 1.9
II	Standard (Glibenclamide + streptozotocin)	0.5	327.50 ± 6.88	247.33 ± 15.5	247.17 ± 13.3	248.3 ± 12.2
III	Petroleum ether extract	250	327.33 ± 4.91	272.17 ± 9.64	272.33 ± 8.7	269.3 ± 8.7
IV	Ethyl acetate extract	250	330.00 ± 6.27	291.50 ± 10.7	290.83 ± 13.6	290.0 ± 8.1
V	Ethanolic extract	250	332.16 ± 4.28	270.83 ± 8.15	265.33 ± 12.2	263.5 ± 11.3
VI	*n*-Butanol extract	250	328.83 ± 5.69	269.83 ± 4.62	269.5 ± 5.7	268.5 ± 7.3

All values are expressed in mean ± standard deviation (n = 6). Standard error of mean < 0.421. All data were found to be significant at 5% level of significance where $p < 0.05$

S. zeylanica with different solvents resulted in separation of constituents of different polarities. Glibenclamide was used as reference standards.

Healthy Wister rats of either sex were used in the present study. They were housed in standard conditions of temperature (25 ± 2 ºC) with 12 h light per day cycle and relative humidity of 45-55 % in animal house of School of Pharmaceutical Education and Research, Berhampur University, Bhanja Bihar, Berhampur, Ganjam. They were kept in fasting condition for 16 h and prior to experiment they were fed with excess water at *libitum*. Animals were caged and all operations on animals were done in aseptic condition.

Antidiabetic activity: The streptozotocin induced diabetic model was used to evaluate the blood sugar level reducing capacity of various extracts. Wister rats were divided in to six groups of six animals in each group. The animals were fasted for 16 h with water *libitum*. Here the blood sugar level of rats was raised by administration of alloxan. After 24 h of administration of streptozotocin, the increase in blood glucose level in each animal was measured by using digital glucometer. The group-I was served as solvent control, which received the distilled water through oral route. The group-II was served as standard control, which received glibenclamide in a dose of 0.5 mg/Kg and group III to VI were received each solvent extract (petroleum ether, ethyl acetate, *n*-butanol and ethanol) in a dose of 250 mg/Kg. After administration of above drugs, blood samples were collected from the tip of the tail just after administration[6,7]. The glucose level for all the samples were determined by glucometer, which is previously validated for correctness.

Statistical analysis: The values are expressed as mean ± S.E.M. All extract are compared with vehicle control group and standard drug (glibenclamide) using one way ANOVA[8].

In the present study the hypoglycaemic activity of different extracts of *Smilax zeylanica* leaves was evaluated in streptozotocin induced diabetic rats (Table-1). Among all extracts the ethanolic extract was shown better result at a dose level of 250 mg/kg. The continuous treatment of leaf extract for a period of 6 h produced a significant decrease in blood glucose level in diabetic rats, which is comparable to that of standard drug glibenclamide, which is used in treatment of type II diabetes mellitus. The standard drug glibenclamide stimulates insulin secretion from β-cells of islets of langerhans. From the study, it is suggested that the possible mechanism by which the plant extract decreases the blood glucose level may be by potentiation of insulin effect either by increase in pancreatic secretion of insulin fom β-cells of islets of langerhans or by increase in peripheral glucose uptake.

Conclusion

The ethanolic extract of *Smilax zeylanica* leaf exhibited significant hypoglycaemic activity in streptozotocin induced diabetic rats. From the phytochemical analysis it was found that the major chemical constituents of the leaf extract were flavonoids and glycosides. On the basis of above evidence it is possible that the presence of flavonoids may be responsible for the observed antidiabetic activity. Further pharmacological and biochemical investigations are underway to find out the active constituents responsible for antidiabetic activity and to elucidate its mechanism of action.

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