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### PHARMACOLOGICAL SCREENING OF *SPHAERANTHUS ZEYLANICUS* LINN ON ANIMAL MODEL

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#### ABSTRACT

The aim of the present study is to evaluate the hypoglycemic and hepatoprotective activity of different extracts on *Sphaeranthus zeylanicus* against alloxan induced hyperglycemic and Paracetamol induced liver damage in rats. The methanol extracts of whole plant (200 mg/kg) and Glibenclamide 10 mg/kg and Silymarin 200 mg/kg were used for the studies. Methanolic extract of whole plants showed significant hypoglycemic and hepatoprotective effect by reduction in blood sugar, serum enzymes SGOT and SGPT in the selected animal model which is compared with standard. The experimental results are suggested that the biologically active phytoconstituents such as flavonoids, alkaloids present in the methanolic extract of *Sphaeranthus zeylanicus* may be responsible for the significant hypoglycemic and hepatoprotective activity.

#### KEYWORDS

Hypoglycemic and Hepatoprotective activity, *Sphaeranthus zeylanicus* and *In vivo* study.

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#### INTRODUCTION

Diabetes mellitus (Hyperglycemia) is a group of metabolic disorders in which a person has high blood sugar, either because the body does not produce enough insulin, or because cells ( $\beta$ cell) do not respond to produce the insulin for the body needed. Much more hypoglycemic drugs are currently available in the market but many of them having poor sugar reducing capacity with least side effects. Herbal medicines have been used for the treatment

of diabetic patients since long and they are currently treatment<sup>1-3</sup>. Oral hypoglycemic agents are useful in the treatment of diabetes mellitus but their use is restricted by their pharmacokinetic properties, secondary failure rates and accompanying side effects and the world health organization expert committee on diabetes has listed as one of its recommendations that traditional methods of treatment for diabetes should be investigated<sup>4</sup>.

*Sphaeranthus zeylanicus* is an aromatic annual herb which is much branched strongly scented with winged stem and the wings toothed. The herb is widely distributed worldwide, especially rich in numbers of plants in arid and semiarid regions of sub-tropical and lower to middle temperate regions. The leaves of *Sphaeranthus zeylanicus* are traditionally used as astringent, diuretics, stomachic, anti-spasmodic, anti-syphilitic and anti-emollient.<sup>5, 6</sup>. It is evident from the literature survey that no systematic study on the hypoglycemic and hepatoprotective activity property of different extracts of *Sphaeranthus zeylanicus* in animal models by alloxan induced hyperglycemic and paracetamol induced hepatotoxicity.

Our plan of the present study is to evaluate the hypoglycemic and hepatoprotective activity of different extracts of *Sphaeranthus zeylanicus* against alloxan induced hyperglycemic and paracetamol induced liver damage in rats.

## MATERIAL AND METHODS

### Plant collection and authentication<sup>7, 8</sup>

The whole plant of the plant *Sphaeranthus zeylanicus* was collected during the month of February 2011. It was then authenticated by Dr. Stephan, Department of Botany, The American College, and Madurai. A voucher specimen has been kept in laboratory for future reference.

### Preparation of extract

The collected plant material is dried at room temperature under shade for 15 days, and then it is blended into coarse powder by electrical grinder. The powdered material is passed through Sieve

accepted as an alternative therapy for diabetes No.22 to get uniform particle size. The coarse powder is cold macerated with Methanol for 48 hours. The extracts are collected by filtration, the marc was separated and the extraction was repeated with fresh solvents for two times. The extracts are concentrated at 55°C on water bath, till it acquires a maximum concentration and evaporated to dryness using rotary evaporator. It was then made into a suspension with 10% aqueous Tween 80 in distilled water and used for preliminary phytochemical test and pharmacological screening.

### Animal

Male Albino rats weighing between 180-220 gm used in the experiment were kept in animal house under standard environmental conditions and had free access to feed and water *ad libitum*. The animals were fasted for 16 hours before experiment but allowed free access to water. The protocol for the present study was approved by institutional animal ethics committee (Approval no. 509/02/C/CPCSEA).

### Preliminary photochemical studies<sup>9</sup>

The Methanol extract of *Sphaeranthus zeylanicus* obtained are subjected to qualitative analysis to test the presence of various phytochemical constituents like alkaloids, carbohydrates, glycosides, flavonoids, steroids, triterpenoids, phenols, proteins, tannins.

### Hypoglycemic Activity<sup>10, 11</sup>

The animals were divided into three groups of six each. Initial blood glucose level was measured by digital glucometer (Accucheck, Reche Pharmaceuticals) with its test strips. Hyperglycemia was induced in all rats by single dose of alloxan monohydrate 100 mg/kg through intraperitoneal route. After 48hr of alloxan monohydrate administration blood glucose level was measured again. Then Group I animals were treated with 10% aqueous Tween 80, Group II animals received Glibenclamide 5mg/kg, Group III animals received methanol extract 200mg/kg. The blood glucose levels of the animals in various groups were recorded at 1hr, 2 hr, 4 hr, 6 hr, 8hr. Blood was collected by puncturing tail vein. A drop of blood

was placed on the reaction side of test strip and was allowed to react for few seconds to read blood glucose levels.

#### Hepatoprotective Activity<sup>12-15</sup>

The rats were divided into three groups each containing six rats. Group I received 10% tween 80 (10 ml/kg, p.o.), Group II received silymarin (200mg/kg, p.o.), Group III received methanol extract of *Sphaeranthus zeylanicus* (200mg/kg, p.o.) respectively. The treatment was continued for seven days. On 8<sup>th</sup> day a single dose of paracetamol (1000mg/kg) suspension was administered to all the groups. After 48 hrs of paracetamol administration, blood was collected from all the groups of rats by direct cardiac puncture. The blood samples were allowed to clot for 45min at room temperature. Serum was then separated by centrifugation at 2500 rpm at 37°C for 10min and analyzed for the biochemical parameters such as SGOT and SGPT and calculated by following formula,

$$\text{Enzyme level} = \frac{\text{Absorbance of test}}{\text{Absorbance of Normal}} \times 1746 \text{ (factor)}$$

$$\text{Percentage activity} = \frac{\text{Standard}}{\text{Test}} \times 100$$

#### RESULTS

Preliminary phytochemical analysis of methanol extract *Sphaeranthus zeylanicus* showed positive results for the presence of Alkaloids, Carbohydrates and glycosides, Phytosterols, flavanoids, phenols and tannins were shown in the table I. Methanol extract of *Sphaeranthus zeylanicus* showed significant anti-diabetic activity at the dose levels of 200 and when compared with standard. The data were expressed in table II and also Methanol extract of *Sphaeranthus zeylanicus* showed significant hepatoprotective activity at a dose of 200 mg/kg when compared with standard drug. The results were shown at table III.

#### DISCUSSION

Alloxan causes diabetes through its ability to destroy the beta cells of the pancreas<sup>16, 17</sup>. *In vitro* studies have shown that alloxan is selectively toxic to pancreatic beta cells, leading to the induction of cell necrosis<sup>18, 19</sup>. The cytotoxic action of alloxan is mediated by reactive oxygen species, with a simultaneous massive increase in cytosolic calcium concentration, leading to a rapid destruction of beta cells<sup>20</sup>.

In the present experiments, the methanol extract *Sphaeranthus zeylanicus* showed hypoglycemic effect at 200 mg/kg in both normal and Alloxan induced normal fasted rat like glibenclamide standard. It is to be studied that the extract brought about these changes by acting through pancreatic mechanism similar to that of glibenclamide.

The 08 hours treatment of alloxan diabetic rats with 200 mg/kg *Sphaeranthus zeylanicus*, glibenclamide 10 mg/kg decreases the blood glucose level significantly ( $p < 0.05$ ) compared to control. In the concentration, it can be stated that the methanol extract *Sphaeranthus zeylanicus* has a significantly antihyperglycemic activity in normal as well as in alloxan induced diabetic rats. The further investigation in the isolated of active principle responsible for this activity may give a potent drug molecule from herbal source in the treatment of diabetes.

In other hand methanol extract of *Sphaeranthus zeylanicus* has a significantly showed Hepatic protective effect in normal as well as in paracetamol induced hepatitis rats by compared with SGOT level SGOT level. Finally these findings are suggested that methanol extract of *Sphaeranthus zeylanicus* may be recommended for both diabetes, hepatotoxicity after further confirmation of the same activity.

**Table No.1: Phytochemical Screening on Various Extracts of *Sphaeranthus Zeylanicus***

S.No	Extracts	Components					
		Alk.	C/Gly	Phy.	Fla.	P&amin	Ph.&Tan
1	Methanol	+	+	+	+	-	+

+ = Presence of constituents

- = Absence of constituents

Alk-Alkaloids, C/Gly-Carbohydrates and Glycosides, Phy-Phytosterols, Fla-Flavonoids,  
P & amin-Proteins and amino acids, Ph. & Tan- Phenols and Tannins.

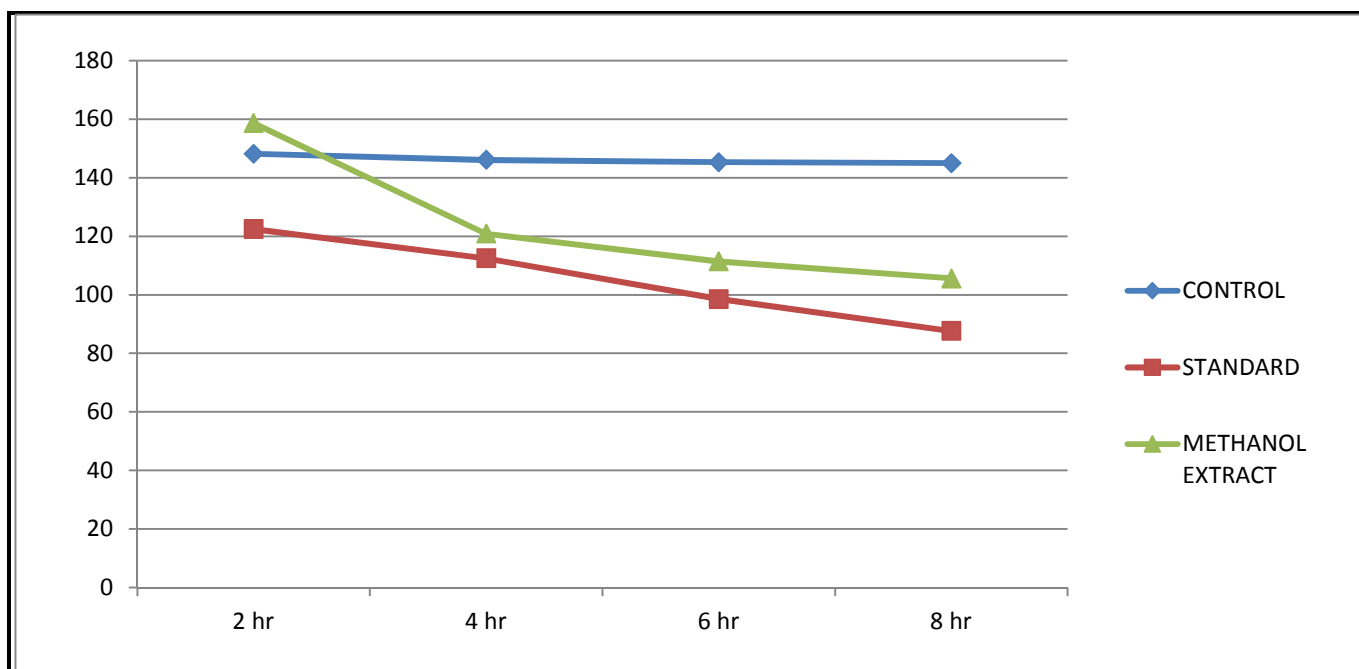
**Table No.2: Effect of the extracts of *Sphaeranthus Zeylanicus* on blood glucose level in alloxan induced diabetes in rats**

Treatment	Dose (mg/kg)	Initial blood glucose level (mg/dl)	Alloxan induced blood glucose level (mg/dl)	Reduction of blood glucose level (mg/dl)			
				2 hr	4 hr	6 hr	8 hr
Control	-	106.3± 0.02	146.7± 0.12	148.2± 0.27	146.1±0.59	145.3±0.98	145.0±0.13
Standard (Glibenclamide)	10	98.22±0.56	166.38±1.5	122.50±0.90	112.58±0.76	98.62±0.64	85.76± 0.37
Methanol extract	200	100.36±0.99	167.50±0.12	158.78±0.32	120.98±0.87	111.43± 0.99	105.63±0.55

n=6, \*P < 0.05 indicates the significant difference compared with control.

**Table No.3: Effect of the extracts of *Sphaeranthus Zeylanicus* on Paracetamol - induced hepatotoxicity in rats**

Treatment	Dose (mg/kg)	SGOT level	% Activity	SGPT level	% Activity
Control Tween 80	10ml/kg	2097.90	-	2263.36	-
Standard (Silymarin)	200	1907.26	91	2090.66	92
Methanol extract	200	1759.53	83.25	1870.98	83



**Figure No.1: Effect of the extracts of *Sphaeranthus Zeylanicus* on blood glucose level in alloxan induced diabetes in rats**

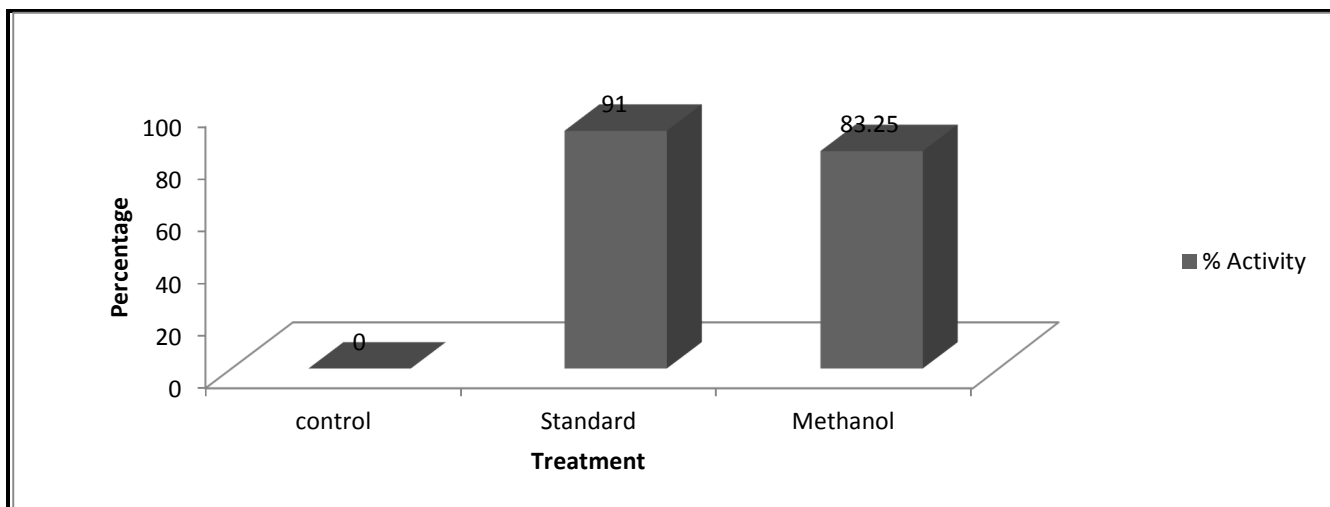


Figure No.2: Effect of the extracts of *Sphaeranthus Zeylanicus* on paracetamol - induced hepatotoxicity in rat in SGOT level

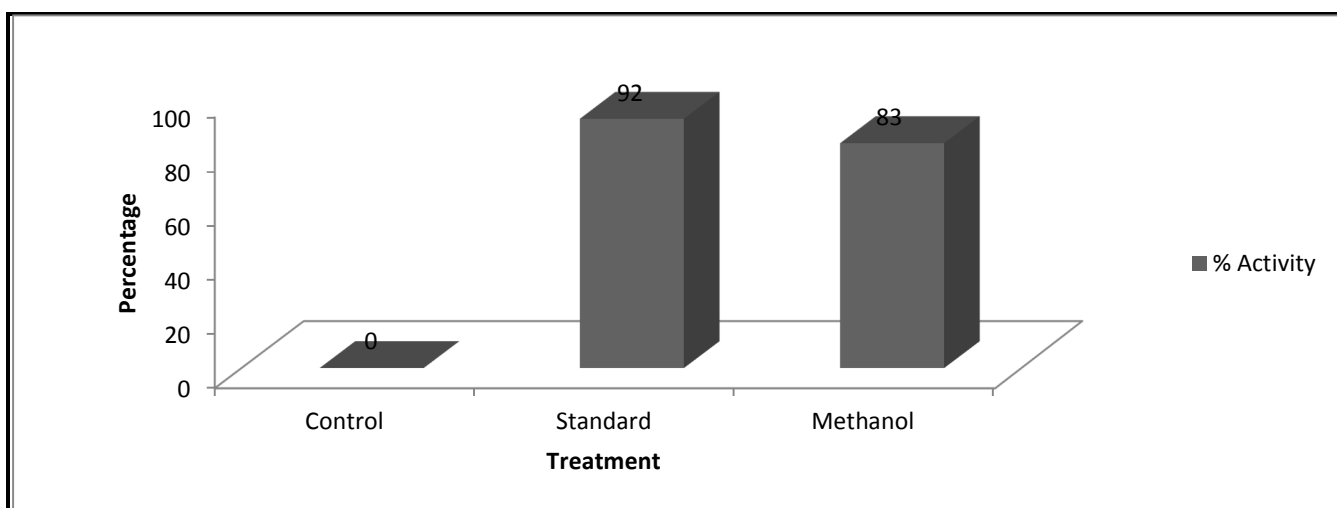


Figure No.3: Effect of the extracts of *Sphaeranthus Zeylanicus* on paracetamol - induced hepatotoxicity In rats in SGPT level

## CONCLUSION

In the present study we conclude that the methanol extract of *Sphaeranthus zeylanicus* possesses significant anti-diabetic and hepatoprotective activities. The plant *Sphaeranthus zeylanicus* may contain one or more constituents responsible for the above activity. So further study can be made on the isolation and characterization of the compounds in future.

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## CONFLICT OF INTEREST

We declare that we have no conflict of interest.

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