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Investigation of Anti-diabetic and Liver Function Test of *Leucas cephalotes* by Streptozotocin Induced Diabetic rats

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ABSTRACT
In the present study the extract from the leaves of *Leucas cephalotes* was used to investigate the antidiabetic activity in streptozotocin induced diabetic rats. The Ethanolic extract of *Leucas cephalotes* at doses of 200/400 mg/kg of body weight and profiling blood glucose levels at 0, 7,14 and 21 days using a glucometer. Biochemical parameter such as serum Bilirubin, Bilirubin direct, Bilirubin indirect, Total protein, Serum albumin and Globulin were also evaluated. *Leucas cephalotes* leaf extract at the tested dose levels of 200 and 400 mg/kg showed a significant reduction in blood glucose level with 150 and 122 mg/dl. When compared with diabetic control group. The observed antidiabetic activity could be associated with the phytochemicals present in the plant extract. So, results indicates that *Leucas cephalotes* leaves extract posses antidiabetic activity over synthetic drug.
Keywords: Streptozotocin, Antidiabetic, *Leucas cephalotes*, Blood glucose level.

INTRODUCTION

Diabetes mellitus is a severe metabolic disorder which indicates by hyperglycemia due to lack of insulin on its target issue or both. It is one of the major public health problem which is now becoming a global epidemic.

The rising blood glucose level is due to combination of unhealthy diet, physical inactivity, defect in insulin secretion in response to food and reduced sensitivity of the target issue to insulin action.

Diabetes is already recongnised as the public health problem of pandemic magnitudes. There are currently more than 150 million people with diabetes worldwide which appears to reach 300 million by 2025.

Currently the main and effective treatment for diabetes is the use of insulin and hypoglycemic drugs, but these compound also have many side effects. Medicinal plants have a long history of use and today they are widely used for various diease. From many decades medicinal plants have been useful resources to treat various diease including diabetes.

Leucas cephalotes belonging to the Lamiaceae family is commonly known as Dronapushpi its various parts are used against the wide range of disease it is a well known traditionally used medicinal plant in the world it have antibacterial, antipyretic,antimicrobial and analgesic activity The antidiabetic potential of *Leucas cephalotes* leaves extract is yet unexplored. Hence this study has been carried out to determine the in vivo antidiabetic activity and liver function test of Ethanolic extract of leaves using the streptozotocin induced diabetes model in wistar rats.

MATERIAL AND METHODS

Experimental animals

The in vivo antidiabetic studies and Acute toxicity of the plant extracts of *Leucas cephalotes* were performed at **Shambhunath Institute of Pharmacy**, Jhalwa, Prayagraj. Bearing the CPCSEA **regd. No-1632/PO/Re/S/02/CPCSEA**.

Preparation of the plant extract

500 gm of coarse powder of leaf packed in a soxhlet apparatus sequentially extract with the petroleum ether, ethyl acetate, ethanol and water as solvent. After the extraction process the extract were concentrated to dryness using rotatory evaporator and store in refrigerator. However, only Ethanolic extract of leaf was used for antidiabetic activity.

Chemicals reagents

Streptozotocin (STZ), was obtained from sisco laboratory Pvt.Ltd. Mumbai,India. Glibenclamide other chemicals and reagents sigma- Aldrich, India were used.

Determination of Acute Toxicity

The acute toxicity of Ethanolic extract of *Leucas cephalotes* were determined by using female Albino Wistar rats (150-250g). all the animals were kept under the standard laboratory conditions.

For acute oral toxicity studies total six animals were taken and they fasted 12 hr before the experiment up and down procedures (OECD Guideline-425) were followed.

Animals were administered single dose of extract of *Leucas cephalotes* at a dose of 2000mg/kg and observed for there mortality during 2 and 7 days study period (short term) toxicity and the dose increase upto 5000mg/kg body weight and were observed upto 7 days for their behavioural, economical and neurological profiles.

Assessment of antidiabetic activity in streptozotocin induced diabetic rats

Experimental Induction of Diabetes in rats was induced experimentally in 12 hours fasted rats by a single intraperitoneal injection of Streptozotocin (55mg/kg) dissolved in 0.1M of citrate buffer (pH 4.5), followed by intraperitoneal administration of Streptozotocin (120 mg/kg) after 15 minutes. Since STZ is capable of inducing fatal hypoglycemia due to the sudden marked release of insulin from the pancreas, the rats that had been administered STZ were provided after 6 hours with a 10% glucose solution orally for 24 hours continuously so as to prevent hypoglycemia. After 72 hours, rats with a blood glucose concentration above 200 mg/dl were considered to be diabetic and were used for further diabetic studies.

Antidiabetic Activity Experimental Design.

After the successful induction of experimental diabetes, the rats were divided into five groups of each five rats.

Group I: Normal control (distilled water 10 ml/kg, p.o)

Group II: Control (Streptozotocin 55mg/kg) by intraperitoneal administration

Group III: Standard group (Glibenclamide 5mg/kg, p.o)

Group IV: Low dose of ethanolic extract of *Leucas cephalotes* (200mg/kg, p.o)

Group V: High dose of ethanolic extract of *Leucas cephalotes* (400mg/kg, p.o)

RESULTS

Table-1 BGL profile of *Leucas cephalotes.*

TREATMENT	DOSE	0^{th} DAY	7^{th} DAY	14^{th} DAY	21^{th} DAY
Normal control	10ml/kg	120	123	124	121
Positive control	55mg/kg	210	225	227	230
Glibenclamide	5mg/kg	209	170	150	120
EE low dose	200mg/kg	225	208	185	150
EE high dose	400mg/kg	223	196	150	122

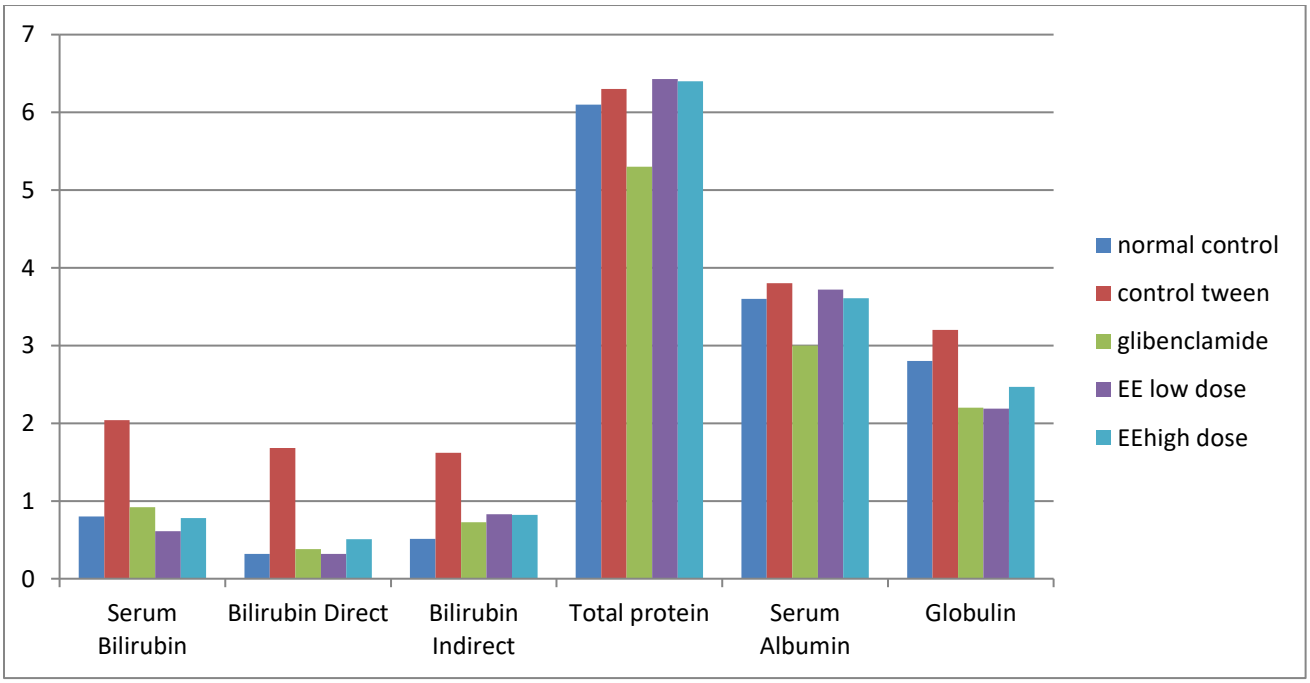

Fig.1 BGL profile of *Leucas cephalotes.*

Table-2 Effect of Ethanolic extract of *Leucas cephalotes* on LFT test.

TREATMENT	DOSE	Serum Bilirubin	Bilirubin Direct	Bilirubin Indirect	Total protein	Serum Albumin	Globulin
Normal control	10ml/kg	0.80±0.010	0.32±0.014	0.512±0.013	6.1±0.096	3.6±0.79	2.8±0.085
Positive control	55mg/kg	2.04±0.065	1.68±0.073	1.62±0.083	6.3±0.178	3.8±0.18	3.2±0.134
Glibenclamide	5mg/kg	0.920±0.012	0.38±0.010	0.725±0.014	5.3±0.122	3.0±0.067	2.2±0.99
EE low dose	200mg/kg	0.9±0.01	0.55±0.02	0.79±0.04	4.21±0.02	2.30±0.14	2.35±0.12
EE high dose	400mg/kg	0.8±0.03	0.48±0.03	0.70±0.02	6.43±0.01	3.17±0.02	2.78±0.10

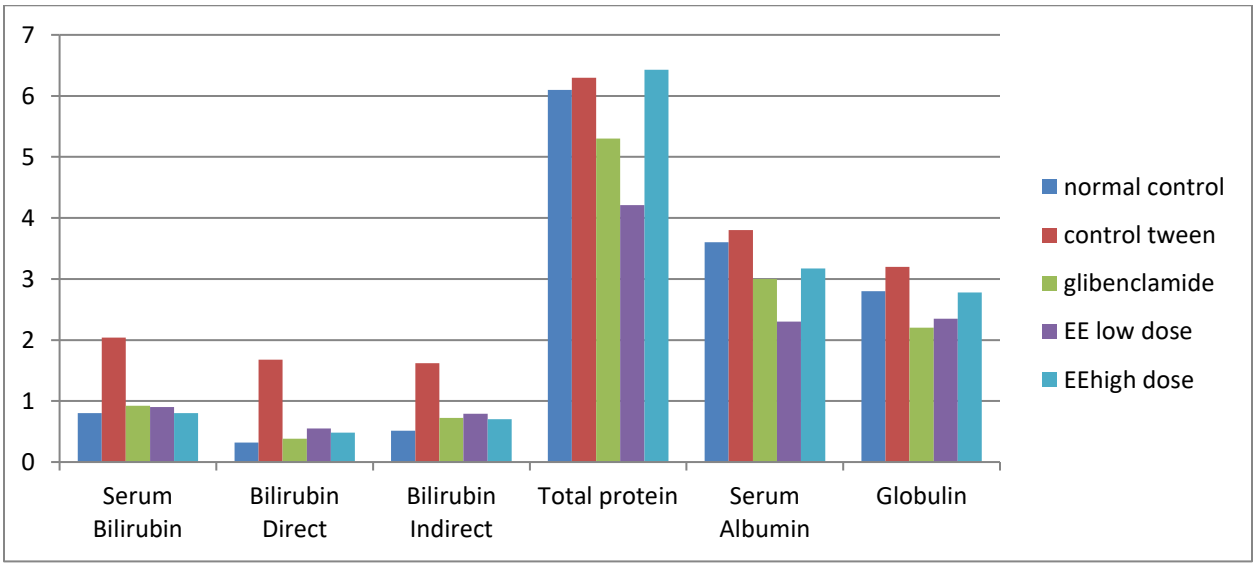

Fig.2 Effect of Ethanolic extract of *Leucas cephalotes* on LFT test

DISCUSSION

No sign and symptoms of acute toxicity and mortality up to 2000 mg/kg body weight were observed during the whole experimental period. The body weight and food consumption were normal compared to vehicle treated rats. For further studies, the doses were fixed as 200, 400 mg/kg body weight.

Streptozotocin induced diabetic rats were increase the levels of blood glucose incomparison to normal rat values. The diabetic rats treated with glibenclamide (5mg/kg) also showed significantly considerable lowering effect in blood glucose level when compared to diabetic treated rats.

In diabetic rats the blood glucose level were significantly decreased after 14 and 21 days of treatment with Ethanolic extract at (200and 400mg/kg) for the drug *Leucas cephalotes* The activity of the Ethanolic extract was found approx equal to standard drug glibenclamide (5mg/kg) treated group.

As per the given data in table 2 *Leucas cephlatoes* the diabetic rats treated with glibenclamide 5mg/kg.,p.o) and Ethanolic extract (200and 400mg/kg) given considerable lowering effect on the levels of total serum Bilirubin, Bilirubin direct and Bilirubin indirect but the dose or ethanolic extract (200mg/kg) giving no significant effect on level of this parameter were compared to diabetic control rats. The diabetic rats treated with standard drug and Ethanolic extract (400mg/kg) of *Leucas cephalotes* gives significant effect on the level of serum total protein, serum Albumin and Globulin when compare to diabetic rats.

CONCLUSION

Ethanolic extract of *Leucas cephalotes* did not demonstrated toxicity in the dose of (2000mg/kg body weight) as per OECD guidelines 425, experimentally on animals which indicate the safety of bioactive phytochemical present in the extract.

Present study concludes that Ethanolic extract concludes that *Leucas cephalotes* showed moderate hypoglycemic activity in diabetic rats compared to positive control (streptozotocin) induced rats and exhibited antidiabetic effect potentially on 0,7,14 and 21 days of treatment with significant improvement in blood glucose level.

Serum Marker enzymes SGOT, SGPT, and the content serum Bilirubin, Bilirubin direct and Bilirubin indirect, total protein, serum albumin and globulin show reducing effect when compared to diabetic rats group.

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