

## Hypoglycemic Effects of *Eryngium Creticum*

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**Abstract** □ *E. creticum* has been used in folk medicine in Jordan as a remedy for scorpion stings in the rural areas and as a hypoglycemic agent. The hypoglycemic activity of an aqueous decoction of plant arial parts of *E. creticum* was tested in normoglycemic and streptozocin-hyperglycemic rats. Results indicate that those extract caused significant reductions in blood glucose concentration when given orally.

**Keywords** □ *Eryngium creticum*, hypoglycemic effects, streptozocin.

*E. creticum* Lam. is one of three species of the genus *Eryngium*, that are presented in Jordan, it belongs to the Umbelliferae subfamily Saniculoidae<sup>1</sup>. *E. creticum* is very commonly found in fallow fields and roadsides in the northern parts of the country. It is perennial or biennial, glaucous and glabrous, reaching 20-50 cm in height. The stems are divaricately much branched from below, with ribbed or angular bluish branches. The early withering basal leaves are 6-10 cm long, with a flat petiole that is longer than the blade, which is bluish, oblong to oval, and lobulate.

An aqueous extraction of the roots of *E. creticum* is applied as remedy for scorpion stings in the rural areas of Jordan; whereas in Paestine, a decoction of the leaves of this plant is used in folklore medicine for antidiabetic purposes<sup>3</sup>. This work was carried out to investigate the possible hypoglycemic effect of the drug using streptozotocin-induced diabetic rats. Junod *et al.*<sup>4</sup>, reported that streptozotocin produce an irreversible diabetic effect on the  $\beta$ -cells of the pancreas.

### EXPERIMENTAL METHODS

#### *Plant material*

*E. creticum* roots were collected from the Mafraq area (70 km south of Amman). Plant roots were air dried and afterwards powdered mechanically. An aqueous extract was prepared by boiling 10 g powdered root with 100 ml distilled water for 45 min,

then filtering twice through filter paper (Whatman no 4). The filtered solution was then brought up to 100 ml with distilled water so that 1 ml was equivalent to 100 mg of starting material.

#### *Streptozotocin-induced hyperglycemia*

Locally inbred male Fisher rats weighing 200-250 g were used. Diabetes was induced by intraperitoneal administration of streptozotocin (Upjohn Company, Kalamazoo, MI, USA) dissolved in 0.1 M citrate buffer pH 4.5 in a dose of 65 mg/kg<sup>4</sup>. Experiments on hyperglycemic animals were performed 1 week after streptozotocin injection. During this period diabetes was well established and blood glucose levels were in the range of 400-500 mg/100 ml. The blood concentration of glucose in normal rats were in the range of 90-110 mg/100 ml.

#### *Biological assays*

The hypoglycemic activity of the plant extract was evaluated as follows: animals were placed in separate cages for 3 days before the experiment to establish their baseline patterns of body weight, daily water and food intake.

On the day of the experiment, blood samples were taken for glucose determination ( $A_0$ ) and drinking water was replaced by the plant extract of *E. creticum*. Control animals were supplied with tap water. Blood samples were then collected 1, 4 and 24 h later ( $A_x$ ) in 100  $\mu$ l heparinized capillary tubes.

Blood glucose concentrations were measured ac-

**Table I. Effect of oral administration of *E. creticum* on blood glucose concentration**

Oral treatment	Liquid consumption (mg/kg/day)	Pretreatment blood glucose	Change in blood glucose(%)		
			1 hr	4 hr	24 hr
Normoglycemic rats					
Water (control)	118± 5.3 <sup>a</sup>	102± 4.9	1.3± 0.6	2.1± 0.9	8.3± 2.1
Decoction	58.4± 5.9	106± 3.8	-3.4± 1.3	-5.3± 1.8	-11± 1.1*
Hyperglycemic rats					
Water (control)	559± 36	421± 54	1.1± 0.7	1.8± 0.9	4.1± 1.8
Decoction	109± 15.6	416± 35	-1.5± 6.3	-31± 8.4	-64.2± 4.1*

<sup>a</sup>Standard error of the mean.

\*Significant relative to pretreatment values at p<0.05.

according to Trinder's glucose oxidase method<sup>5</sup>. The percentage change in glucose level was calculated by applying the following formula<sup>6,7</sup>.

$$\% \text{ change of glucose level: } (A_x - A_o/A_o) \times 100$$

Statistical analysis were performed using student's unpaired T-test.

## RESULTS

The effect of *E. creticum* decoction mixed with drinking water on the blood glucose concentration is presented in Table I. The data show a significant decrease in the glucose concentration of both normoglycemic rats (20%) and hyperglycemic rats (64.2%), but the decrease in normoglycemic rats were not statistically significant at p<0.001.

## DISCUSSION

The genus *E. creticum*, which belongs to the Umbellifae subfamily Saniculoidae, is represented by Jordan by three species, namely *E. creticum* Lam., *E. falcatum* Laroche and *E. glomeratum* Lam<sup>1</sup>.

It is reported that root extracts of the different *E.* species are used in a folk medicine for diuretic, antidiabetic and antispasmodic purposes as well as in the treatment of liver diseases, lowback pain, asthma, whopping cough and in certain poisoning conditions<sup>3,8</sup>. In Jordan, however, an aqueous extract of roots of *E. creticum* is applied as a remedy for scorpion stings in the rural areas (personal interview with natives of the Mafrak area).

Oral administration of plants extract mixed with drinking water produced a statistically significant decrease in blood glucose concentration for both normoglycemic and hyperglycemic rats (p<0.05) ac-

ording to the data in Table I. The reduction in blood glucose level following the administration of *E. creticum* is difficult to explain at this time. It was reported that some medicinal plants with hypoglycemic properties are known to increase circulatory insulin levels in normoglycemic rats<sup>6,9</sup>. This seems unlikely with *E. creticum* since it is expected that streptozotocin would have produced complete irreversible damage to the  $\beta$ -cells of the pancreas. However, it is difficult to assess the degree of  $\beta$ -cell destruction and the capability of these cells to release insulin under our experimental conditions. *E. creticum* may increase the peripheral utilization of glucose. Jimenez *et al.*<sup>7</sup> reported that *Salvia lavandulifolia* (Fam. Labiatae) have a hypoglycemic effect that is independent of insulin. In explaining the hyperglycemic action of an *Artemisia extract in alloxan diabetic rabbits*<sup>10</sup> has reached to the postulation that the plant decoction may increase the peripheral utilization of glucose.

## CONCLUSION

In conclusion, the folk use of *E. creticum* in diabetes may be validated and further investigation and controlled clinical trials will be required for safety and its hypoglycemic action.

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