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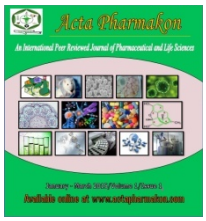

Research Article

Evaluation of Antidiabetic activity of aqueous extract of *Cressa cretica* L. in Streptozotocin induced Diabetes in Rats

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ABSTRACT

To evaluate the antidiabetic activity of aqueous extract, of the whole plant of *Cressa cretica* L. Diabetes was induced by intravenous injection of Streptozotocin at dose of 60 mg/kg. Aqueous extract of the *Cressa cretica* L. at a dose of 200 mg/kg 400 mg/kg body weight was administered to Streptozotocin induced diabetic rats. The biochemical parameters cholesterol, triglycerides, HDL & LDL were also assessed in the experimental animals. The aqueous extract (200 mg/kg & 400 mg/kg) exhibited significant antihyperglycemic activity and it also decreased the biochemical parameters like cholesterol, triglycerides & LDL levels in treated groups as compared to these parameters in diabetic control. However HDL level was increased in treated animals as compared to the diabetic control group. The aqueous extract lowered the blood glucose level is almost near to the effect of the standard drug. This study supports the traditional claim that the aqueous extract of this plant could be added in traditional preparations for the treatment of various diabetes associated complications.

1. INTRODUCTION

Diabetes mellitus a chronic metabolic disorder resulting from insulin deficiency, characterized by hyperglycemia, altered metabolism of carbohydrates, protein, lipid and an increased risk of vascular complication.[1] In present situation diabetes is possibly the world's largest growing metabolic disorder throughout both developed and developing countries. Hence, all newly diagnosed

patients with type II diabetes mellitus should have an initial trial of dietary and exercise modifications. However, many patients require pharmacological treatment without an optional trial of nutrition and physical activity. Monotherapy with a sulfonylurea or metformin can be used as first line pharmacotherapy. However, if fasting blood glucose is >250 mg/dl or random blood glucose is>400 mg/dl, insulin should be used as initial therapy. Although insulin and oral hypoglycemic agents are the major players in the treatment of the diabetes mellitus, but they have prominent side effects and fail to significantly alter the course of diabetes.[2,3,4,5] The world health organization has recommended that traditional plant treatment for diabetes warrant further evaluation.[6] An antidiabetic agent could exert a beneficial effect in the diabetic situation by enhancing insulin secretion and or by improving/mimicking insulin action.[7] Nowadays, the use of complementary and alternative medicine and especially the consumption of botanicals have been increasing rapidly worldwide, mostly because of the supposedly less frequent side-effects when compared to modern western medicine.[8]

Cressa cretica (Convolvulaceae) is a small branched under shrub growing extensively in sandy and saline soils of Punjab state of India and in the arid tropical regions of the world.[9] It is an erect herb; aerial parts normally ranging from10-20 cm, with ashy white colour, and has slightly unpleasant odour and a salty taste.[10] All parts of the plantare used as an aphrodisiac, expectorant,stomachic, bitter tonic, to enrich the blood and totreat leprosy, asthma and urinary discharges. The plant has a sour bad taste.[11]

Cressa cretica is reported to be antibilious, antituberculosis, and expectorant. The whole aerial part is proved to have be anti-tussive potential. Shahat et al., 2004, yielded five flavonoids (quercetin, quercetin-3-Oglucoside, kaempferol- 3-O-rhamnoglucoside, and rutin) from the aerial parts of *Cressa cretica*.It is also reported the fruits of *Cressa cretica* is a potential source of edible oil. The oil of *C. cretica* was free from any undesirable components and could safely be recommended for human consumption. In addition, the antiviral activity from the plant was reported. It is already reported that the aerial parts of the plant contains scopoletin, isoflavone glycoside coumaranochromone glycoside. Syringaresinol glucoside and dicaffeoyl quinic acid were also isolated.[12] In the present study, the detailed antidiabetic activity of the extracts of *C. cretica* was investigated using Streptozotocin Induced Diabetes model.

2. MATERIALS AND METHODS

2.1 Plant material

The whole plant of *Cressa cretica* (Linn) for the research work was collected in October 2010 from FRLHT Bangalore, and was authenticated by Dr. D.C. Saini, Senior Scientist, Palaeobotany, Birbal Sahni Institute of Palaeobotany, Lucknow, India. A voucher specimen no. 33320 was submitted in the department of Pharmacognosy, Teerthanker Mahaveer College of pharmacy, Moradabad. 4 kg of fresh whole plant was collected and dried under shade for 10 days & was mechanically reduced to moderate coarse powder and stored in an air tight container**.**

2.2 Preparation of Extracts

250 g of coarse powder of whole plant of *Cressa cretica* was successively extracted with solvents of increasing order of polarity starting with petroleum ether, chloroform, ethyl acetate, methanol and water using Soxhlet apparatus. The extraction was carried out for around 60 hours

with each solvent. All the extracts were evaporated to dryness using rotary evaporator and collected in the form of semi-solid mass.

2.3 Phytochemical Screening

In order to determine the presence of alkaloids, carbohydrates, flavonoids, proteins, amino acids, phenols, tannins, glycosides and steroids, a preliminary phytochemical study with various plant extracts was performed. [13, 14, 15]

2.4 Animals and Treatment

Male Albino-Wistar rats weighing 150-250 g were used in the present study. All the animals were obtained from College of Pharmacy, TMU Moradabad, India and kept in polypropylene cages with paddy husk as bedding. Animals were housed at a temperature of 24 ± 2°C. All animals were fed with a standard diet & water *ad libitum* and they were left for one week in order to adapt to the laboratory conditions. All the experimental procedures and protocols used in this study were reviewed by the Institutional Animal Ethics Committee (Reg. No:1205/c/08/CPCSEA) and were in accordance with the guidelines of the CPCSE.

3. EXPERIMENTAL PROTOCOL

3.1 Streptozotocin Induced Diabetes

The rats were divided into five groups i.e. The first group served as normal maintained on standard chow diet and water ad libitum, second group received 1ml of 0.5 % w/v CMC, third group served as standard (Glibenclamide 10 mg/kg p.o.),while fourth and fifth group received water extract at 200 mg/kg & 400 mg/kg body weight respectively. 200 mg/kg & 400 mg/kg extracts were suspended in 0.5% w/v of CMC solution & was administered orally. The blood glucose level was measured by digital glucometer (Gluco One by Dr. Morpen). The

Table 1: Effect of aqueous extract of whole plant on fasting blood glucose level in diabetic rats.

Groups	Fasting blood glucose concentration (mg/ml)					
	Day 1	Day 4	Day 7	Day 10	Day 15	Day 21
Normal Control	102 ± 1.949	105 ± 1.065	98 ± 1.461	96 ± 1.125	104 ± 0.7303	100 ± 0.9309
Diabetic Control	327 ± 2.477	325 ± 1.770	322 ± 2.309	315 ± 2.191	312 ± 2.206	307 ± 2.113
Standard	360 ± 1.211***	220 ± 1.506***	165 ± 1.461***	148 ± 1.915***	130 ± 1.461***	105 ± 0.9661***
Test-A 200 mg/kg	320 ± 1.673*	318 ± 0.9661**	314 ± 1.155**	306 ± 0.8165**	264 ± 2.206***	210 ± 1.065***
Test-B 400 mg/kg	318 ± .5774 **	302 ± 1.592***	220 ± 1.461***	155 ± 1.065***	117 ± 1.862***	108 ± 0.5774***

All values are expressed as mean ± SEM (n=6). *P<0.05, **P<0.01, ***P<0.001.as compared with control (One-way ANOVA followed by Dunnett's test).

streptozotocin (60 mg/kg) was administered to these rats by intravenous injection. After 10 days when the glucose level get stabilized the test and standard drug dose treatment given to the rats. The extract and the standard drug were administered orally from the same day of streptozotocin induced and continued till the glucose level normal (30 days). The blood glucose level and body weight of the each rat was measured after every 5 days from the

starting treatment. The blood was collected by retro orbital puncture and various biochemical parameters were analysed. [16]

3.2 Statistical analysis

The values are expressed as mean ± SEM. The results were analyzed for statistical significance using one-way ANOVA, followed by Dunnett's-test.

4. Results

The results from the study clearly indicated that the aqueous extract of *Cressa cretica* exhibited significant hypoglycemic activity in STZ-diabetic rats at the interval of 1, 4, 7, 10, 15, 21days, and reduced the levels of Cholesterol, LDL, HDL and triglycerides. However this effect was less than that of the standard glibenclamide, which also showed a significant decrease of blood glucose levels and biochemical parameters.

5. Discussion

The antidiabetic activity of aqueous extract of whole plant of *Cressa cretica* against streptozotocin induced diabetes was studied. The extent of induction of diabetes was estimated by

Table 2: Effect of aqueous extract of whole plant of *Cressa cretica* on lipid profile in STZ-induced model

Groups	Serum Parameter			
	TG	TCH	HDL	LDL
Normal Control	85.00 ± 0.9661	85.60 ± 1.137	39.20 ± 1.178	50.20 ± 0.6314
Diabetic Control	149.0 ± 0.9661	160.0 ± 2.572	26.40 ± 0.8745	93.40 ± 1.032
Standard	88.00 ± 1.549***	95.00 ± 0.7303***	33.50 ± 0.5916***	51.50 ± 0.3445***
Test-A 200 mg/kg	144.0 ± 0.4472**	115.0 ± 1.222***	31.10 ± 0.2793*	97.00 ± 0.7298*
Test-B 400 mg/kg	95 ± 1.033***	95.30 ± 1.116***	32.80 ± 1.751***	30.30 ± 0.9869***

All values are expressed as mean ± SEM (n=6). *P<0.05, **P<0.01, ***P<0.001.as compared with control (One-way ANOVA followed by Dunnett's test).

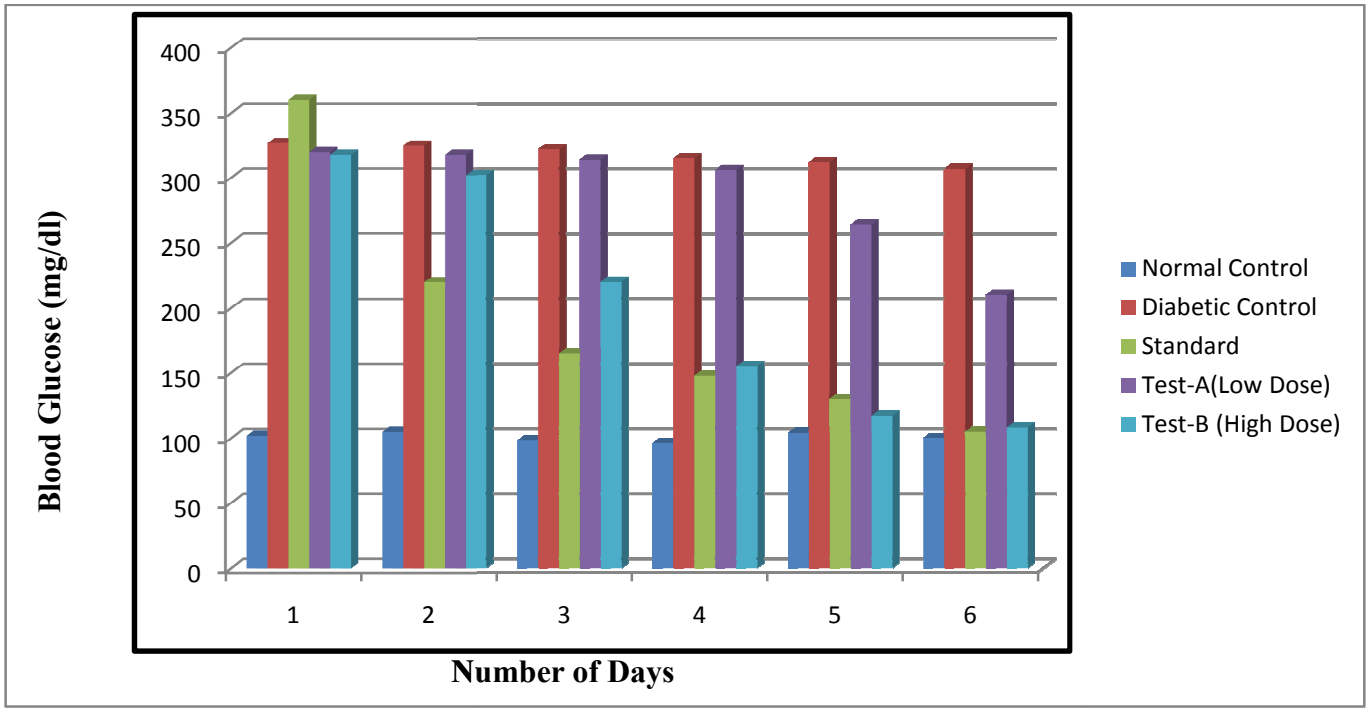

Figure 4.19 Graph showing effect on blood glucose level of aqueous extract of whole plant of *Cressa cretica* on streptozotocin induce diabetes

increased blood glucose, level, cholesterol, triglycerides, HDL, LDL and histopathological studies**.** There was a significant increase in the blood glucose level during diabetes when compared to control rats. The treatment with extract as well as the standard drug glibenclamide significantly reduced the blood glucose levels.

The aqueous extract (200mg/kg & 400 mg/kg) significantly decreased the triglyceride, cholesterol & LDL levels in the treated groups as compared to these parameters in diabetic control. However, HDL level in treated animals exhibited an increase as compared to the diabetic control group. It is thus apparent that the hypoglycemic effect may be probably brought about by pancreatic mechanism. [17]

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