

## ANTIDIABETIC ACTIVITY OF ETHANOLIC EXTRACT OF *SWERTIA CHIRAYITA* BUCH-HAM

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### ABSTRACT

In the given study we had worked on the antidiabetic activity of plant *Swertia chirayita* Buch-Ham family Gentinaceae. The ethanolic extract was orally administered with the dose of 250mg/kg and 500mg/kg on STZ-NAD induced diabetic albino mice. Findings of this research showed that ethanolic extract possess significant ( $P<0.01$ ) antidiabetic activity and had beneficial effect on cholesterol and triglyceride level. The results were compared with standard drug Metformin.

**KEYWORDS:** *Swertia chirayita*, antidiabetic activity, ethanolic extract, mice, metformin.

### INTRODUCTION

The genus *Swertia* (family Gentinaceae) is widespread in nature. It comprises 170 species which are closely related to each other. All have their own traditional and medicinal properties to treat various ailments and to cure the various diseases. It is basically a bitter plant. It consists of annual and perennial herbs<sup>1-2</sup>. The *Swertia* herbs are also extensively used as bitter tonics and febrifuges in the Ayurvedic system of medicine<sup>3</sup>. Traditionally it is used in the treatment of various ailments like anthelmintic, astringent, diuretic, demulcent and expectorant. It is also effective in menstrual cramps, headache, fever, inflammation and swelling. It is substituted with *Andrographis paniculata*. The trade name is chirette<sup>4-5</sup>.

### MATERIALS AND METHODS

#### Collection and identification of plant materials

The sample of plant was collected from Darjeeling during september- october, 2007. The plant material was botanically identified by Dr. M.N. Shrivastava, Sr. Scientist, Botany Division, CDRI, Lucknow. A voucher specimen has been retained in the Department of Pharmaceutical Sciences, Guru Jambheshwar University of Science and Technology, Hisar.

#### Preparation of Extract

The dried drug (about 5 kg) was placed in the percolator with ethanol (4 × 45) litre and kept for about 48 hrs. Extraction was repeated 4 times in the soxhlet apparatus. The combined extract was concentrated under reduce pressure using rota-vapour and water bath at 45°-50°C. The weight of whole crude ethanolic extract (green colour) was 147 gm.

#### Experimental Animals

Wistar albino mice (30-35gm b/w) were procured from Disease Free Small Animal House, Chaudhary Charan Singh Haryana Agriculture University, Hisar (Haryana). The animals had free access to food and water. The animals were kept fasted overnight after drug administration. The experimental protocol was approved by Institutional Animals Ethics Committee (IAEC) and animal care was taken as per the guidelines of Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA), Govt. of India.

**Induction of Nicotinamide-Streptozotocin Diabetes**

Albino wistar mice were fasted for overnight. All group of animals were injected with STZ (Streptozotocin, 100 mg/kg, *i. p.*) freshly diluted in citrate buffer (10 mmol/L, sodium citrate, pH 4.5) after 10 min. leading induction of NAD (Nicotinamide, 110 mg/kg). The control group received only the vehicle solution CMC (Carboxy Methyl Cellulose) in an equivalent volume. No mortality occurred in the NAD-STZ-treated group during the first day after the diabetes induction. After weaning (day 21), the animals were kept in groups of 6 in collective cages at 23°C and with a full access to food and water for the following 2 weeks and then used for study. Blood samples were collected from retro-orbital plexus. Mice with the fasting blood glucose level of  $\geq 200$  mg/dl will be considered as diabetic and selected for further pharmacological studies<sup>6</sup>. The test extract was given for 10 days and biochemical investigation was done.

**Animal Protocol**

Each group contain no. of animals = 6 (n = 6)

**Group 1:** Normal control mice

**Group 2:** Diabetic control (Animals were administered vehicle only)

**Group 3:** Diabetic animals were administered Metformin (100 µg/kg; p.o.).

**Group 4 and 5:** Diabetic animal were administered orally 250 mg/kg p.o. and 500 mg/kg p.o. ethanolic extract of *Swertia chirayita* respectively.

**Data Analysis**

All the results were expressed as mean  $\pm$  standard error of mean (SEM). The data of all the groups were analyzed using one-way ANOVA followed by Dunnett's t-test using the software Sigma-Stat 3.5. In all the tests, the criterion for statistical significance was  $p < 0.01$ .

**RESULT**

To check the activity of extract from *Swertia chirayita* Buch-Ham, diabetes was induced by streptozotocin-nicotinamide. At the specified time blood samples were collected to perform the biochemical estimation. The results obtained for test samples are shown in table 1.

The test extract of *Swertia chirayita* showed significant results when compared with the standard drug Metformin which depicts the importance of *Swertia chirayita* as an antidiabetic agent.

**DISCUSSION**

In biological investigation, the ethanolic extract of *Swertia chirayita* was screened for antidiabetic activity. Antidiabetic activity of this plant has been proven by some researchers<sup>7-8</sup> also, but in this work we checked this activity by replacing the earlier model with streptozotocin-nicotinamide (STZ-NAD) model. The ethanolic extract showed significant activity by reducing the serum sugar level, cholesterol level and triglyceride level. However, this work scientifically authenticates the antidiabetic use of the plant *Swertia chirayita* by changing the experimental model which has been proved earlier.

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**Table 1: Effect of ethanolic extract of *Swertia chirayita* Buch-Ham on serum glucose, cholesterol and triglycerides in NIDDM mice after 30 days of treatment**

Treatment	Serum Glucose (mg/dl)	Serum Triglycerides (mg/dl)	Serum Total Cholesterol (mg/dl)
Normal +CMC 1 ml/kg, p.o/30days	102.83 ± 4.785	91.500 ± 8.409	86.333 ± 7.401
Diabetic control STZ and NA + CMC 1 ml/kg, p.o/30days	214.17 ± 10.849 <sup>†</sup>	257.67 ± 10.509 <sup>†</sup>	256.67 ± 12.145 <sup>†</sup>
Diabetic + Metformin 100 µg/kg , p.o/30days	122.83 ± 7.674**	116.50 ± 8.036**	102.0 ± 7.317**
Diabetic + Ethanolic extract 250 mg/kg, p.o/30 days	143.83 ± 9.350**	159.33 ± 9.528**	139.68 ± 9.610**
Diabetic + Ethanolic extract 500mg/kg, p.o/30 days	132.33 ± 8.333**	140.63 ± 9.478**	124.5 ± 8.233**

Values expressed as mean ± SEM for six animals in each group.

\*\* $P < 0.01$  when compared to diabetic control group;

<sup>†</sup> $P < 0.01$  when compared to normal control group

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