

**SUBCHRONIC TOXICITY STUDY OF ALCOHOLIC EXTRACT OF  
*PACHYRRHIZUS EROSUS* (LINN.) SEEDS**

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**Summary**

The subchronic toxicity study of *Pachyrrhizus erosus* seeds in rats was investigated. The extract was administered at a dose of 75 and 150 mg/kg body weight per oral (p.o.) to the test group, and distilled water was given to control group. The different parameters measured were increase in body weight and food intake, hematological parameters (total RBC, total WBC, hemoglobin, clotting time and differential leukocyte count), test for renal functions (serum creatinine, blood urea nitrogen and uric acid), test for liver functions (SGPT, SGOT and alkaline phosphatase) and lactate dehydrogenase for cardiac cell functions. The food consumption of control group was lesser than treated groups and percentage weight gain of control group was more compared to the treated group. Food consumption was increased by 20-28% in treated animal as against 11.4% in control animals after 90 days. There were significantly increase in lymphocyte number and clotting time in the group treated with high dose of test drug against control, while neutrophil number decreased significantly. Total RBC, total WBC and hemoglobin count did not vary much. All biochemical parameters were found within normal limits of treated groups compare to control group except alkaline phosphatase level. It was found that all the animals appeared alert and were in good health, but there was little mortality in the treated groups in second last and last week of the test period. The present study indicated that longer run use of the extract may be harmful, but shorter period of time may be useful for CNS disorders.

**Key words:** *Pachyrrhizus erosus*, subchronic toxicity study, liver function, renal function, cardiac cell function.

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## Introduction

*P. erosus* (Linn.) belonging to family Leguminosae is cultivated in South East Asia including India. It is commonly known as 'Yam bean' and 'Jicama'. Seeds of the plant contain rotinoids, isoflavonoids and phenylcoumarins which are reported to possess potent activity against herpes simplex virus type I and II<sup>1</sup>. Seeds are also having antifungal, antisecretory, insecticidal, spasmolytic, cytotoxic<sup>2</sup> and antibacterial activity against *Helicobacter pylori*<sup>3</sup>, Roots contain two major proteins named YBG1 and YBG2, which exhibit cystine proteolytic activity<sup>4</sup>. The aim of the present study is to investigate the subchronic toxicity study of the alcoholic extract of *P. erosus* as safety assessment is one of the parameters for the standardization of herbal drug as per WHO guidelines.

## Materials and Methods

### Plant material collection and preparation of extract:

The seeds of *P. erosus* were obtained from Kolkata, West Bengal, India in winter season. They were dried, coarsely powdered and subjected to successive extraction with petroleum ether, chloroform and alcohol using soxhlet apparatus. The extracts were dried by rotary vacuum evaporator and stored in desiccator until further use.

### Subchronic toxicity study:

Wistar rats of both sexes, two month old and weighing 150-160 gm were used for the experiment. Animals were divided into three groups of eight rats each. Two of the groups received 75 and 150 mg/kg body weight of the extract respectively, while the control group received distilled water only. In this study numerous types of observations and evaluations were performed which included daily observations, periodic physical examination, monitoring of body weight and feed consumption, and analysis of hematological and biochemical parameters<sup>5</sup>. After 90 days of treatment blood was collected from the animals for hematological and biochemical studies as below:

Estimation of serum creatinine<sup>6, 7</sup>, blood urea nitrogen<sup>8</sup> and uric acid<sup>9, 10</sup> under renal function; estimation of serum glutamate pyruvate transaminase (SGPT), serum glutamate oxaloacetate transaminase (SGOT) and alkaline phosphatase<sup>11, 12</sup> for liver function; estimation of lactate dehydrogenase<sup>13</sup> for cardiac cell function; and RBC count, WBC count, percentage hemoglobin, clotting time and differential leukocyte count were determined as hematological parameters<sup>14, 15</sup>.

### Statistical analysis:

Results were expressed as mean  $\pm$  SEM. Data were analysed by one-way analysis of variance (ANOVA) followed by Dunnett's test and were considered statistically significant when  $p < 0.05$ .

## Results and Discussion

Table 1 shows the increase in body weight and food consumption after 90 days of treatment. The food consumption of control group was lesser than treated groups and percentage weight gain of control group was more compared to the treated group.

**Table 1. Effect of alcoholic extract of *P. erosus* on weight gain and food consumption**

Groups	% Weight gain after 90 days	% Food consumption increased after 90 days
Control	96	11.4
Extract (75 mg/kg, p.o)	94	20
Extract (150 mg/kg, p.o)	90	28

In hematological study there were significant increase in lymphocyte number and clotting time; and decrease in neutrophil number, in the group treated with high dose of extract against control. RBC, WBC and hemoglobin count did not vary much (Table 2).

**Table 2: Effect of alcoholic extract of *P. erosus* on hematological parameters**

Groups	WBC /Cumm	RBC /Cumm	HB (G%)	C.T. (Sec)	L %	N %	E %	M %
Control	6325 ± 286.87	798.5 ± 22.99	17.21 ± 0.17	51.66 ± 3.07	75.83 ± 1.62	21.00 ± 1.50	2.66 ± 0.33	0.33 ± 0.21
Extract (75mg/kg, p.o)	641.66 ± 369.38	1871 ± 83	17.4 ± 0.18	57.5 ± 2.50	78.16 ± 2.00	19.16 ± 1.74	2.33 ± 0.42	0.16 ± 0.16
Extract (150mg/kg,p.o)	4125.68 ± 239.22	710.8 ± 69.58	17.44 ± 0.35	71.00 ± 4.00**	87.20 ± 1.15**	9.8 ± 0.86**	2.4 ± 0.50	0.40 ± 0.24

All values are Mean ± SEM, n = 6, \*\*P<0.01 When compared with control

All biochemical parameters were found within normal limits in treated groups compared to control group except alkaline phosphatase level (Table 3).

Table 3: Effect of alcoholic extract of *P. erosus* on biochemical parameters

Groups	SGPT U/l	SGOT U/l	ALP U/l	UA mg/dl	CRTN mg/dl	UREA mg/dl	LDH U/l
Control	53.56	191.00	347.01	1.25	0.33	47.80	1828
	± 8.4	± 22.85	± 26.52	± 0.24	± 0.05	± 3.28	± 1236
Extract (75mg/kg, p.o)	62.73	134.38	57.21	1.5	0.03	57.83	1273.74
	± 9.45	± 14.78	± 7.21**	± 0.05	± 0.30	± 4.72	± 514.23
Extract (150mg/kg,p.o)	55.02	201.08	131.06	1.66	0.32	56.26	1715.80
	± 8.62	± 21.34	± 19.74**	± 0.38	± 0.03	± 26.29	± 191.55

All values are Mean ± SEM, n = 6, \*\*P<0.01 When compared with control

During the study all the animals appeared alert and were in good health, but little mortality were observed in the second last and last week of the test period. Hence, long run use of the extract may be harmful and shorter period of time may be useful as it is effective against CNS disorders<sup>16</sup>.

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