

Hepatoprotective Effects of *Andrographis paniculata* against Carbon Tetrachloride-Induced Liver Damage

A. C. Rana and Y. Avadhoot

College of Pharmacy, Shri Govindram Seksaria Institute of Technology and Science, Campus 23, Park Road, Indore. (M.P.) 452-003, India

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Abstract □ Alcoholic extract of the leaves of *Andrographis paniculata* Ness (=AAP) was obtained by cold maceration. A dose of 300 mg/kg (1/60th LD₅₀) of the extract was selected to study hepatoprotective action against carbon tetrachloride-induced liver damage. The extract was found to be effective in preventing liver damage which was evident by morphological, biochemical and functional parameters.

Keywords □ *Andrographis paniculata*, hepatoprotective

Andrographis paniculata is reported to possess many pharmacological actions. It is known to accelerate intestinal digestion and absorption¹⁾, Nematicidal property²⁾, inhibitory action on microsomal enzymes³⁾ and anthelmintic properties⁴⁾ of *A. paniculata* are also reported. *A. paniculata* has been claimed to be useful in liver ailments⁵⁾. The present study was undertaken to evaluate its efficacy in preventing liver damage induced by carbon tetrachloride.

EXPERIMENTAL METHODS

Hepatoprotective action of the alcoholic extract of the leaves of *A. paniculata* (=AAP) was studied in albino rats of either sex weighing 60-80g. These animals were weighed and divided into three groups, each group having six animals.

Group A: Normal animals, which were not given either CCl₄ or AAP.

Group B: Control animals.

Group C: Drug treated animals.

Damage was produced by using carbon tetrachloride (1 ml/kg with equal volume of liquid paraffin, s.c.) twice weekly, for a period of eight weeks. A 5% suspension of the alcoholic extract of the leaves of *A. paniculata* was prepared with 1% carboxy methyl cellulose (CMC) in distilled water. The animals of the group 'C' were treated with 300 mg/kg of AAP orally, with the help of

intra-gastric catheter daily for eight weeks. The animals also received simultaneously, subcutaneous injection of CCl₄ twice weekly for a period of 8 weeks. The animals of group 'B' were injected with CCl₄, s.c., twice weekly for a period of eight weeks.

Assessment of damage and efficacy of AAP was evaluated with the help of three parameters:

1. Morphological parameters which include changes occurring in the weight of animals, weight and volume of liver.

2. Biochemical parameters viz. serum enzyme level of alanine transferases, i.e. SGPT and alkaline phosphatase.

3. Functional parameters: Pentobarbitone sleeping time test.

*Pentobarbitone sleeping time test*⁶⁾

The test was performed to assess the efficacy of functioning liver cells. Sleeping time (time interval between loss and gain of righting reflex) was determined.

Collection of blood samples for biochemical estimation

All the animals were injected with 100 units of heparin intraperitoneally. After 20 min, 4 ml of blood was collected in heparinized sample tubes by cutting the tail. The samples were immediately used for biochemical estimation. After the animals were anesthetized with anesthetic ether, the liver was removed. The organ was observed carefully for any

Table I. Evaluation of hepatoprotective activity of alcoholic extract of *A. Paniculata*.

Parameters	Group 'A' Normal animals Mean±s.e.	Group 'B' CCl ₄ control Mean±s.e.	Group 'C' AAP treated Mean±s.e.
Animal no.	6	6	6
Change in animal weight (g) per 100g of initial weight	116.66±1.28	120.18±3.40	122.20±2.50
Liver weight (g) per 100g body weight	6.47±1.16	8.16±2.38	6.40±2.20
Liver volume (ml) per 100g body weight	5.17±2.48	7.56±3.12	5.45±1.48
SGPT (units/l)	231.50±6.94	542.66±4.27	240.0±5.58
Alkaline phosphatase (units/l)	407.20±4.72	507.50±3.50	412.28±6.24
Sleeping time (min)	109.33±2.51	138.0±2.64	68.18±5.22
Necrosis	—	+	—

balance. Its volume was measured by water displacement method.

RESULTS

Morphological parameters

Per cent changes in the weight of animals among different groups after 8 weeks was found to be insignificant. Significant changes were observed in morphological parameters between the CCl₄ control group and the normal group. Liver weight and volume increased in the control group ($p < 0.05$) when compared with those of the normal group. Insignificant difference ($p > 0.05$) in liver weight and volume was observed between the AAP-treated group 'C' and the normal group 'A'.

Biochemical parameters

At the end of 8 weeks, there was pronounced rise ($p < 0.001$) of SGPT and alkaline phosphatase activity in the CCl₄-treated control group. In the AAP treated group 'C', SGPT and alkaline phosphatase levels, though slightly higher than normal, were significantly less as compared to those of the CCl₄-treated control group ($p < 0.01$).

Functional parameters

Sleeping time in the CCl₄-treated control group was significantly more ($p < 0.05$) than that of the normal group. In the AAP treated group, sleeping time was significantly less than the those of normal and control group.

DISCUSSION

Hepatoprotective action of AAP was studied in albino rats and its efficacy was evaluated by using various parameters. Increased SGPT and alkaline phosphatase levels and increases in liver weight and volume indicate pathological condition of the liver as observed in the control group. In the AAP treated group, however, these values were closer to normal range, indicating normalization of the liver function.

Oxybarbiturates (pentobarbitone sodium) are biotransformed in the liver by cytochrome P450 enzyme system. In various pathological conditions of liver where liver function is impaired, the activity of this enzyme system may be decreased which prolongs the barbiturate-induced hypnosis.

The group of animals receiving AAP showed significant decrease in hypnosis (sleeping time) as compared to that of the control group, indicating indirectly improvement in the functioning of the liver cells.

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