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RESEARCH ARTICLE

Hepatoprotective Potential of *Abutilon Hirtum Sweet* Leaves In Carbon Tetrachloride Induced Hepatotoxicity.
Hepatoprotective Activity Of *Abutilon Hirtum Sweet* Leaves.

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ABSTRACT

Natural products serve as lead molecules for development for the many popular drugs. Herbal drugs are having fewer side effects than the other class of drugs which are coming from the synthetic source. *Abutilon hirtum* (Lam.) Sweet, belonging to family *Malvaceae*. The present study deals with the hepatoprotective potential of *Abutilon hirtum* in view to give scientific evidence to the folklore claim on the hepatoprotective activity of the leaves. The leaves were collected and extracted using decoction method in water. Sylimarin was used as standard. The serum of each animal of all groups were analyzed the biochemical parameters serum glutamic-oxaloacetic transaminase (SGOT), Serum glutamic-pyruvate transaminase (SGPT), alkaline phosphatase (ALP) and total bilirubin content. The above findings indicated that the leaf extract of *A. hirtum* possess significant hepatoprotective activity.

Keywords: *Abutilon hirtum,* decoction, SGOT, SGPT, Alkaline phosphatases, carbon tetrachloride.

INTRODUCTION

Abutilon hirtum (Lam.) Sweet belongs to family *Malvaceae*, commonly known as Indian mallow and Belabenda. It is a common weed and abundantly found in wasteland, arable lands, and stream banks of all most all districts in Andhra Pradesh, India. [1, 2, 3] Traditionally, the leaves used as demulcent, diuretic and diarrhea. The decoction of the leaves used as mouth wash, Bladder inflammations, wounds and treatment of ulcers. [2, 5, 6]. Alkaloids are reported from the roots of the plant [4, 7]. Since the plant is claimed to have many medicinal uses, there was no systematic and scientific data has been recorded. Hence, in the present work, *Abutilon hirtum* has been taken up to give scientific evidence to the folklore claim on the hepatoprotective activity of the leaves in the form of decoction.

MATERIALS AND METHODS

PLANT MATERIAL:

The fresh leaves (5 kg) of *A. hirtum* were collected from Pakala forest, Narsampet, Warangal district of Andhra Pradesh, India and botanically identified and authenticated by Prof. V. S. Raju, Department of botany, Kakatiya University, Warangal. A voucher specimen (KSR/01/2008) was deposited in the Department of Pharmaceutical Sciences, Andhra University, Vishakhapatnam. The collected plant material was dried under shade, pulverized, passed through sieve no. 40 and used for further studies.

PREPARATION OF EXTRACT:

The aqueous extract of *A. hirtum* leaves was obtained by decoction process for 30 min from 500 g of the dried leaves in 3 liter of water. The filtrate when evaporated in *vacuum* yielded a brown colored sticky residue (designated as AEAH) (16.81%w/w).

EXPERIMENTAL ANIMALS:

Adult Wistar rats (150-200g) and Swiss albino mice (for toxicity studies) of either sex were used in the studies. The animals were kept in standard polypropylene cages at room temperature of 30±2 ^{0}C and 60-65 % relative humidity. All the experimental procedures were approved by Institutional animal ethical committee of Vaagdevi College of Pharmacy, Hanamkonda, Andhra Pradesh, India vide approval No. 1047/AC/09/CPCSEA.

GROSS BEHAVIORAL AND TOXICITY STUDIES OF HYDRO ALCOHOLIC EXTRACT OF ABUTILON HIRTUM:

The aqueous extract of leaves of *A. hirtum* was screened for the gross behavioral and toxicity studies in selected Swiss albino mice. Groups of mice comprising six animals each were treated with 100, 200, 400,800, 1000 and 2000 mg/kg of the extract suspended in 0.5% w/v sodium carboxy methyl cellulose were administered orally, via a gastric catheter. The animals were then observed continuously for first four hours for any behavioral changes and for mortality if any at the end of 72 h. However, no mortality was observed in the animals. Hence AEAH was

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selected to screen for its hepatoprotective activity at dose level of 100 mg/kg and 200 mg/kg body weight.

HEPATOPROTECTIVE ACTIVITY OF LEAF AQUEOUS EXTRACT OF A. HIRTUM

Adult Wister Albino rats of either sex, weighing between 180 to 220 g were used for the study. The animals were divided into 5 groups of 6 animals each and were fed standard pellet diet and supplied water *ad libitum*. Hepatoprotective activity of the aqueous extract of the leaves of *A. hirtum* was evaluated as per the method suggested by Srinivas *et al.* The animals were allowed to acclimatize to the laboratory environment for 7 days. The vehicles used for the study was 0.5% w/v sodium carboxy methyl cellulose in distilled water. Group-I served as control, which received only vehicle (0.2 ml / 100 g) through oral route. All other groups of animals received one of the following treatments. Sylimarin (20 mg/kg) and aqueous extract (100 mg/kg or 200 mg/kg) were administered respectively in a similar manner. Carbon tetrachloride (1.25 ml/kg) was administered intraperitoneally 30 min after the first dose of test samples [6, 8, 9]

All the animals received three doses of test samples at 12 h interval. After 12 h of the last dose of test samples, all the rats were anaesthetized with ether. Blood samples were collected by puncturing the retro-orbital plexus and serum was separated after coagulating at 37^0 C for 30 min and centrifuging at 2000 rpm for 20 min.

ESTIMATION OF BIOCHEMICAL PARAMETERS:

The serum of each animal of all groups were analyzed the biochemical parameters serum glutamic-oxaloacetic transaminase (SGOT) (Fig.No.1), Serum glutamic pyruvate transaminase (SGPT) (Fig. No. 2), alkaline phosphatase (ALP) (Fig. No. 3) and total bilirubin content (Fig. No 4). SGOT and SGPT [8], alkaline phosphatase [9], total bilirubin content [10]. All the tests were carried out with serum diagnostic kits supplied by Span Diagnostic Ltd., Mumbai. The results were presented in Table- 1. Histopathological studies of the liver tissue from all the groups was also performed and their pictures were shown in figure no. 5.

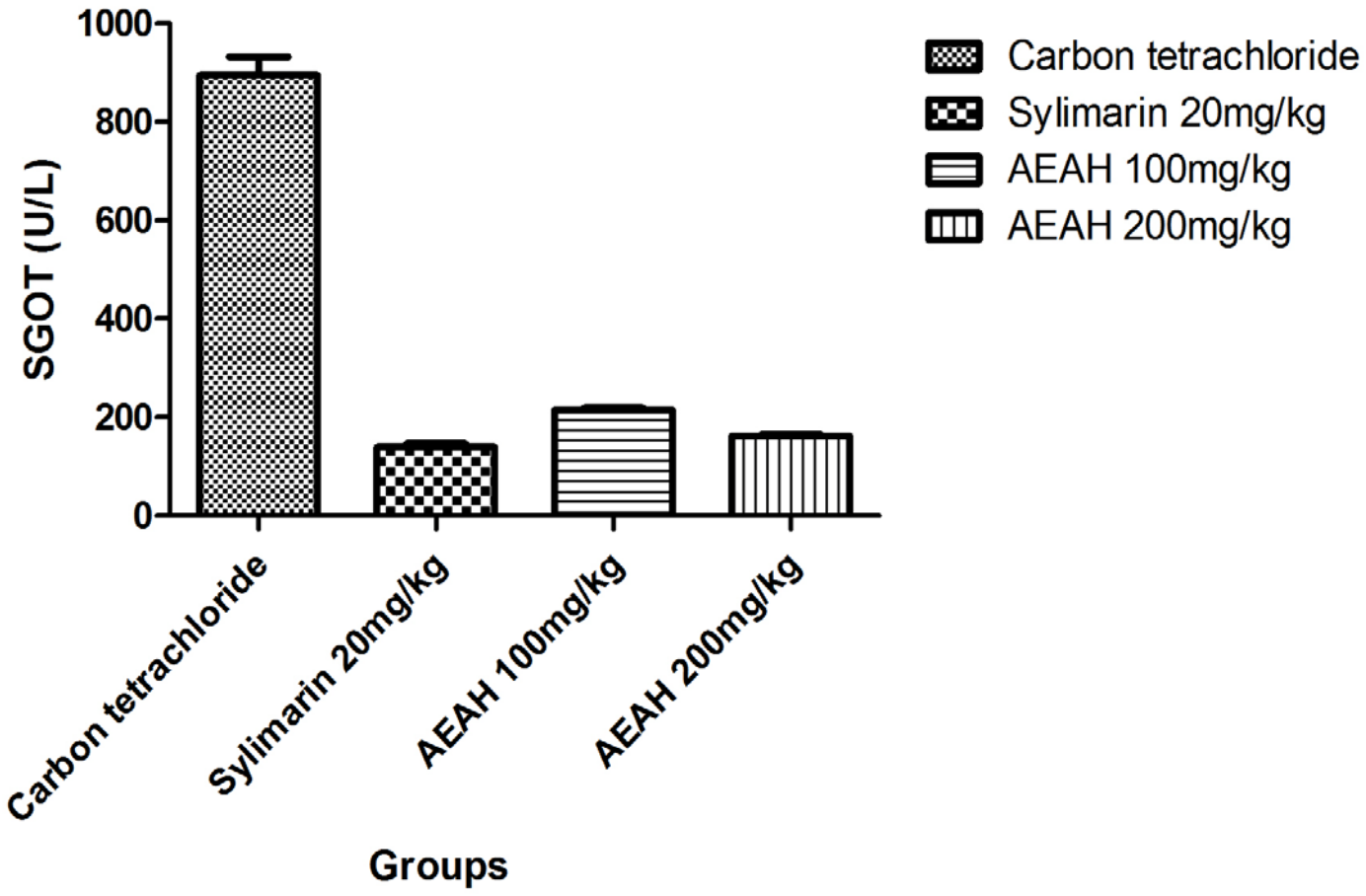

Fig. No. 1 Effect of *A. hirtum* aqueous extract on SGOT levels

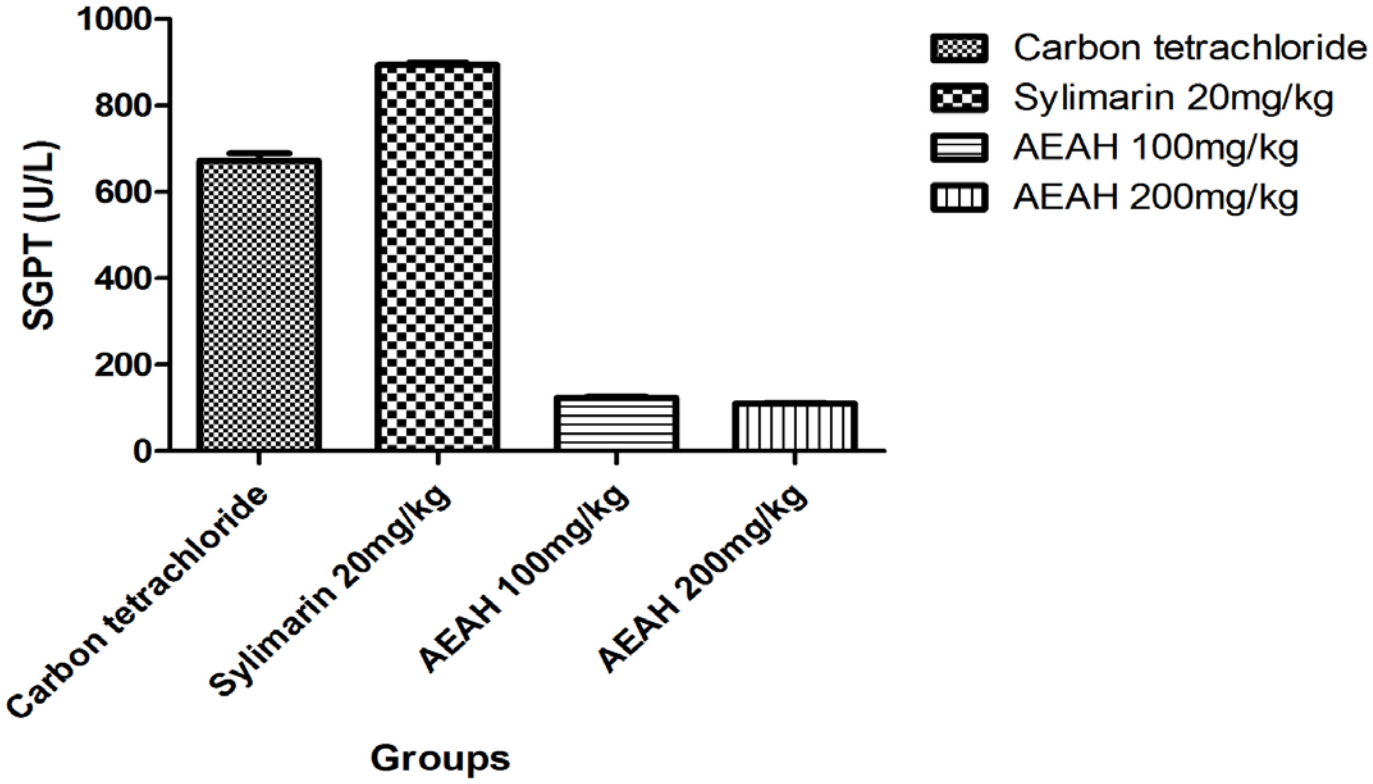

Fig. No. 2 Effect of *A. hirtum* aqueous extract on SGPT levels

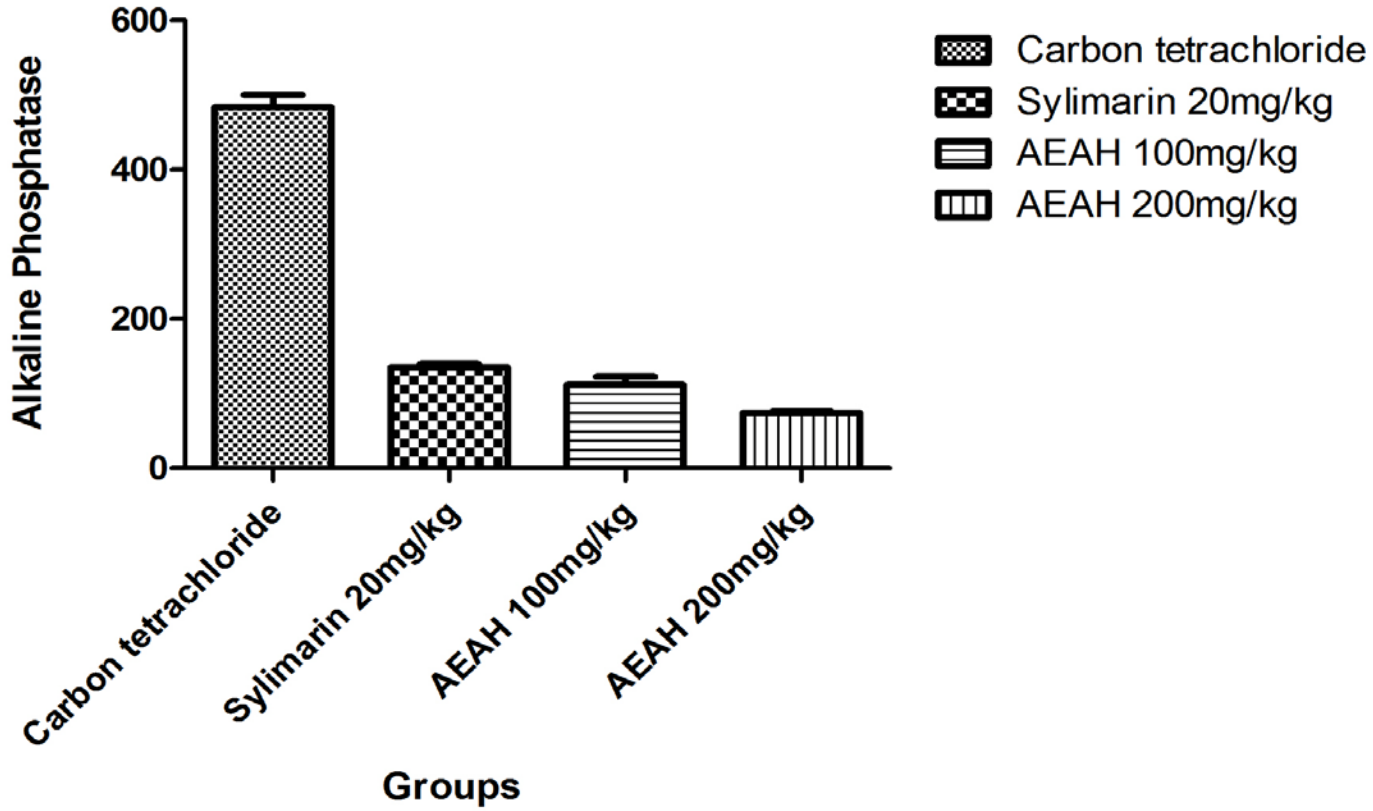

Fig. No. 3 Effect of *A. hirtum* aqueous extract on alkaline phosphatase levels

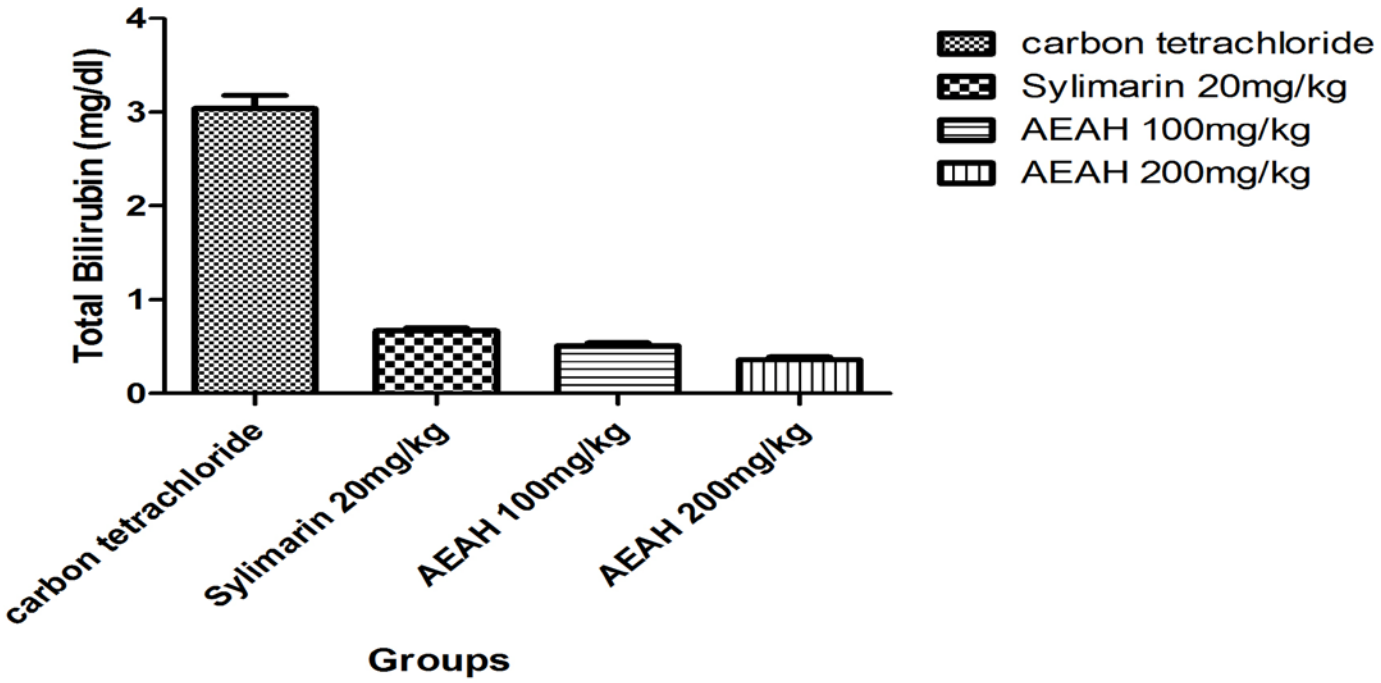

Fig. No. 4 Effect of *A. hirtum* aqueous extract on total bilirubin levels

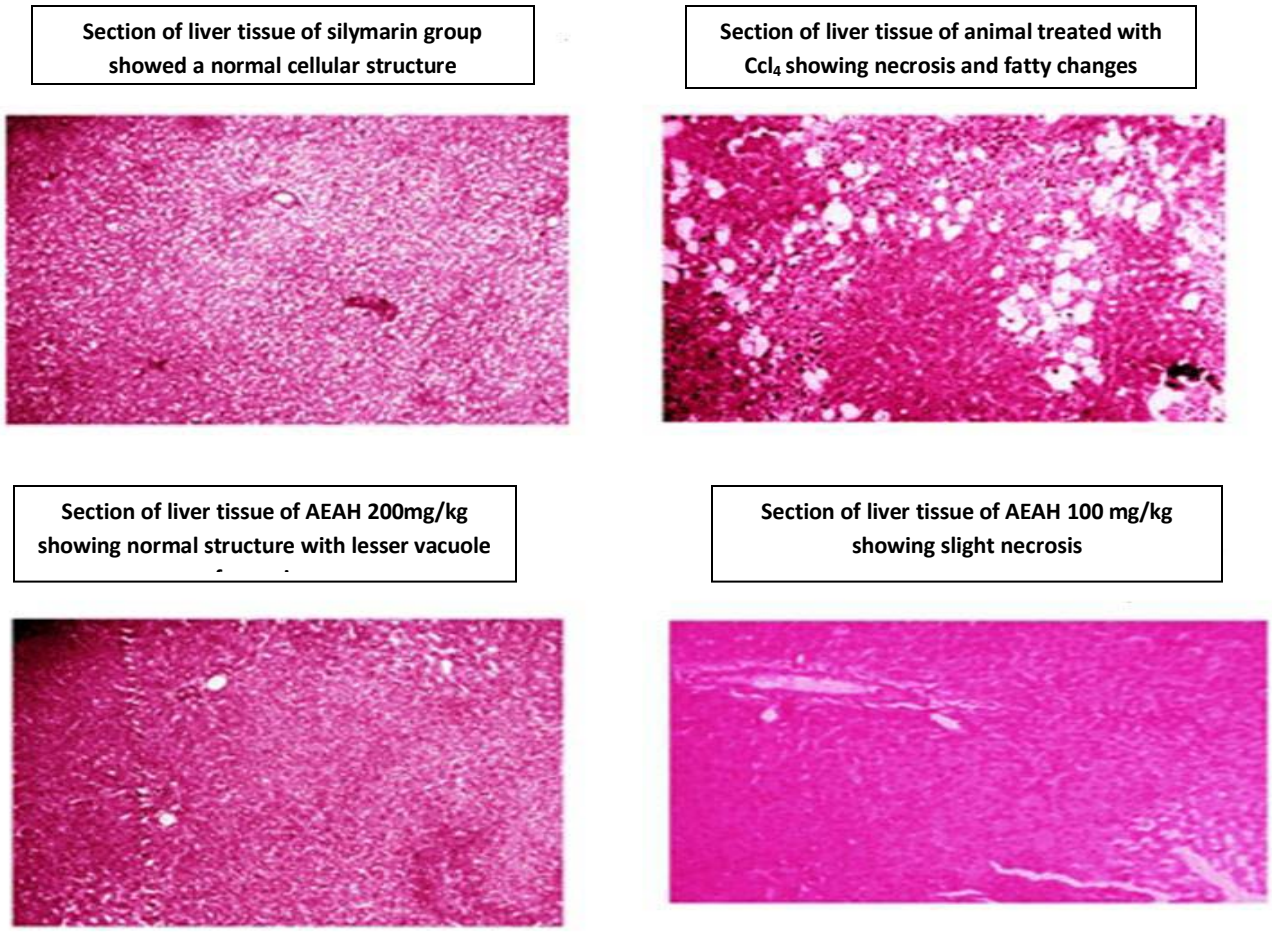

Fig. No. 5 Effect of *A. hirtum* aqueous extract and standard drug on rat liver tissue

Groups	SGPT (U/L)	SGOT (U/L)	Alkaline Phosphatase	Total Bilirubin (mg/dl)
Group-I (CCl_4)	671.8 ± 17.81	894.7± 37.1	483.5 ±16.78	3.04 ± 0.142
Group-II (Sylimarin 20mg/kg)	57.9±3.12*	139.6±6.4*	135.2 ±4.69*	0.67±0.031*
Group-III (AEAH 100mg/kg)	123.6±2.73*	215.3± 4.6*	111.6 ± 11.1*	0.51 ±0.03*
Group-IV (AEAH 200mg/kg)	110.2±2.16*	162.3±3.5*	74.4±1.67*	0.36 ± 0.03*

Table No. 1 Effect of *A. hirtum* aqueous extract on serum enzyme and bilirubin level
Results expressed as mean ± S.E.M from six observations
Significant reduction compared to Carbon tetra chloride = *p< 0.05

STATISTICAL ANALYSIS:

The Mean ± S.E.M. Significance of differences between control and treated groups was determined using Student's *t*-test and the level of significance was set accordingly.

RESULTS AND DISCUSSIONS

The results showed that the serum enzyme levels were very high in rats with CCl_4 (Group-I). When compared with Group-I, the values of enzyme level (Fig. No.1, 2, 3 and 4) were found to be significantly ($p< 0.05$) lower. The extract at all tested dose levels showed comparable hepatoprotective activity as that of the Sylimarin treated rats. When the dose of the extract was doubled, the hepatoprotective activity was significantly increased in a dose dependent manner though not proportionately. In histopathological studies, liver tissue from the Ccl_4 treated group shown necrosis and fatty changes where as liver cells from standard group showing normal cellular structure and AEAH at 100 mg/kg shown slight necrosis and in 200 mg/kg shown lesser vacuole formation (Fig. no. 5). The above findings indicated that the leaf extract of *A. hirtum* possess significant hepatoprotective activity.

CONCLUSION

The Ccl_4 has been used as a tool to induce hepato toxicity in experimental animals. This toxic chemical caused per oxidative degradation in the adipose tissue resulting in fatty infiltration of the hepatocytes [10]. The increase in the levels of serum bilirubin reflected the depth of jaundice and the increase in bilirubin and alkaline phosphatases was the clear indications of cellular leakage and loss of functional integrity of the cell membrane. The above proceedings are clearly demonstrating that the aqueous extract is a good herbal hepatoprotective agent. The possible reason for this activity may be the presence of flavonoid and phenolic compounds as secondary metabolites in the leaf extract. If this data is validated in clinical trials, *A. hirtum* may offer an effective herbal hepato protective agent.

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