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Acute Toxicological Evaluation of the Aqueous Extract of *Eclipta alba* Hassk

Naseem M Qadri*, Shahnaz Ahmad, Shamim Qureshi and Yasmeen Badar

Pharmaceutical & Fine Chemical Research Centre, PCSIR Laboratories Complex, Karachi-75280, Pakistan

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Acute toxicological evaluation of *Eclipta alba,* Hassk, was carried out on albino mice through oral, parenteral and systemic routes. The severity and depth of toxicities exhibited by either route were found to be dose dependent. The aqueous extract of *E alba* exhibited a marked action on the central nervous system. LD50 as calculated for oral, intravenous and intraperitoneal routes were 7.841 g kg^{-1}, 302.8 and 328.3 mg kg^{-1} respectively. An aqueous extract of *E. alba* was found to be safe and non-toxic at a dose of 2.0 g kg^{-1} for oral and 200 mg kg^{-1} for intravenous and intraperitoneal routes.

Key words: *Eclipta alba* Hassk., Toxicity study, *E prostrata*, Compositae.

Introduction

Eclipta alba, Hassk, (Compositae), synonym *Eclipta prostrata* Linn, commonly known as "Bhangra Boti", is a common weed, found through out India and Pakistan at moist, damp, shady and on irrigated places (Kirtikar and Basu 1953; Nadkarni 1954; Baqar 1989). The plant is of great importance medicinally and has a well documented record of its medicinal use in Estern and Unani system of treatments, locally as well as systematically (Nadkarni 1954; Dhar *et al* 1968; Satyavati *et al* 1987). Principally plant is used as a tonic, (Magre *et al* 1981; Handa *et al* 1986) deobstruent, in hepatic spleenic enlargements, (Nilamadhab *et al* 1990; Franca *et al* 1995) and in many internal diseases (Kirtikar and Basu 1953; Nadkarni1954) for relieving pain, rheumatism, asthamatic conditions and as antipyretic (Nadkarni 1954). Locally it is used as a remedy for snakebite (Sastri 1953; Mehra and Handa 1968; Walter *et al* 1989), scorpion sting, for healing cuts, wounds, ulcers, eczema and other allied irritated skin conditions (Nadkarni 1954). Cosmetically it is used as hair tonic for controlling grey hairs (Zhenghen *et al* 1989; Zhang 1990; Yokogawa 1997) and commercially as a feed for livestock (Vijay *et al* 1987).

An ample data regarding the phytochemical analysis of *Eclipta alba* is available, which reveals the presence of alkaloids, steroids, flavonoids, (Sarg *et al* 1981; Sikorira *et al* 1982; Mohammad Ali and Jyoti 1997), phytosterols, resins, glycosides, triterpenes, amino acids (Choudri and Joseph 1986; Brinda *et al* 1988), sugars resine, sulfur containing peptides, Ecliptal, a new terthienyl aldehyde along with wedelolactone (Bargave *et al* 1970; Brinyak and Chakravarthy 1991) and dermethyl wedelolactone, a hepato-protective agent (Kirtikar and Basu 1933; Nilamadhab *et al* 1990).

The utilization of *Eclipta alba* plant as a source of drug requires, convincing proofs of absence of toxic or deleterious effects. Therefore, toxicity studies on laboratory animals are mandatory to label the plant as a safe beneficial medicinal plant, which is already being indexed under the heading of poisonous plant (Baqar 1989). Hence, this communication deals with the acute toxicity studies of the aqueous extract of *Eclipta alba* through oral and parenteral routes. LD50 was calculated by the arithmetical method of Rood and Muench (Turner 1965).

Materials and Methods

Extraction. Fresh mature whole plant of *Eclipta alba* (i.e root, shoots & flowers) was purchased from a local herbalist, washed, cut into small pieces and dried in oven at 45°C± 5°C for 24 h. Plant was extracted according to the method of Kastigar (1958).

Dried plant material (1.5kg) was soaked in 95% alcohol for 96 h with continuous agitation for 8 h daily. Solvent was then decanted and treated with charcoal to remove chlorophyll and refiltered. The filtrate was then concentrated in vacuo yielding 453g of gel like mass known as alcoholic extract. A part (250g) of the alcoholic extract was then partitioned with water and petroleum ether (2:1,v v^{-1}). Aqueous layer was then separated and concentrated under reduced pressure at room temperature into a semi solid mass marked as aqueous extract which was used for acute toxicity studies.

Toxicity studies. Animals. Healthy albino Swiss mice of either sex reared at PCSIR animal house weighing 25-30 g were

*Author for correspondence

selected for acute oral and parenteral route toxicity studies.

Animals were maintained on standard pellet diet and water *ad libitum.* They were housed in standard plastic cages having a dimension 12.0 x 8.5 inches at top, 10.5 x 8.0 inches at bottom and 6.5 inches high. To facilitate their movements saw dust was spread in cages.

All experimental animals were kept in an airconditioned room having a temperature of 25°C ± 2°C with 40-50% humidity and with artificial illumination for 12 h (i.e. 7PM-7AM), for a period of five days before and after testing. Cages were marked with their respective doses and routes of administration Each dose group comprised of 8 animals and each dose was repeated thrice to confirm the results. Control group was run simultaneously on similar lines using distilled water. Feeding and injecting volume was kept constant through out the study. Care was taken not to injure the animals while feeding. Distilled water was used as a solvent.

Oral route. Different concentrations (ranging from 100-800 mg kg^{-1}) of the aqueous extract of *E. alba* were administered orally in a single dose by means of an appropriate gauge to different groups of animals. All dose groups were observed closely for first 6 h and then for 24 h.

Parenteral route. Extract was injected intravenously and intraperitoneal in different concentrations to each group of animals respectively by increasing 25mg dose each time. Volume and time taken for injection was kept constant.

All animals were observed carefully for gross behavioural changes (Turner 1965) Mortality rate was noted and after autopsy macroscopic findings were noted. LD50 was computed on the basis of 24 h mortality.

Results and Discussion

Assessment of the toxicological manifestation of the aqueous extract of *Eclipta alba* through oral and parenteral (intravenous and intraperitoneal) routes revealed marked variation in the severity and depth of symptom. Furthermore signs and symptoms exhibited were found to be dose and route dependent.

Oral route. No mortality was observed upto a dose of 6000 mg kg^{-1}, while dores above that resulted in death. LD_{50} was found to be 7841 mg kg^{-1} (Table 1). A dose of 2000 mg kg^{-1} was found to be safe while doses above that exhibited toxic sign and symptoms. Gross physical and behavioural changes upto a dose of 3500 mg kg^{-1} was vasodilation, activeness, alertness and fast respiration. All these signs and symptoms abated within 2-5 min while doses above that exhibited dose dependent toxic signs and symptoms. Common manifestations were vasodilation followed be vasoconstriction, piloerection tachycardia, retching/gagging, nausea, convulsion, frequent urination, abnormal gait, disturbed equilibrium, decreased locomotive activity, cynosis, loss of consciousness, coma and eventually death. In lethal doses animal showed apathy towards external stimuli.

Amelioration of all these signs and symptoms took 10-90 min depending upon the concentration of the extract used. Necropsies and autopsy revealed no gross pathological changes attributable to aqueous extract except some hemorrhagic spots on heart and liver.

Parenteral toxicity. The aqueous extract was found to be nontoxic at a dose of 200 mg kg^{-1} through intravenous and intraperitoneal routes. LD_{50} was found to be 302.8 and 328.3 mg kg^{-1} for intravenous and intraperitoneal routes respectively (Table 2). Sign and symptoms observed for intravenous and intraperitoneal routes were same as observed through oral route. The difference was only in the time of onset and duration of action. The important features observed were vaso-

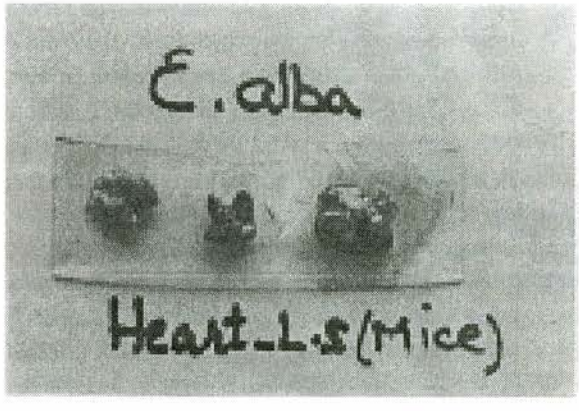

Fig 1. Longitudinal section of the heart showing the presence of blood clot.

Table 1
Oral toxicity of aqueous extract of *E alba* in albino mice

Group No.	Dose of the extract (mg kg^{-1})	Mortality (percent)
1.	5000.	NIL
2.	5500.	NIL
3.	6000.	NIL
4.	6500.	5
5.	7000.	12.5
6.	7500.	30.769 LD_{50} 7841 mg kg^{-1}
7.	8000.	58.33
8.	8500.	85.71
9.	9000.	94.44
10.	9500.	100

Table 2
Intravenous and intraperitoneal toxicity of *Eclipta alba* Hassk

Group No.	Dose of the extract mg kg^{-1} for I.V & I.P route	Mortality for I.V route (%)	Mortality for I.P route (%)	LD 50
1.	200.	NIL	0.00	
2.	225.	NIL	0.00	
3.	250.	NIL	5.88	
4.	275.	5.882	21.42	I.V 302.8 mg kg^{-1}
5.	300.	21.428	46.15	I.P 328.3 mg kg^{-1}
6.	325.	46.153	71.42	
7.	350.	71.428	88.23	
8.	375.	88.235	95.23	
9.	400.	95.238	100.00	
10.	425.	100		

constriction, decreased physical activities ataxia. (abnormal gait & disturbed equilibrium) marked depression, pupillary constriction and piloerection with marked chill, tremor, sedation, unconsciousness, difficulty in breathing, coma and finally death. Amelioration of all these signs and symptoms took 10-70 min in non lethal doses while in lethal doses, time was enhanced to 150 min. In doses where the animal survived, the aqueous extract of *Eclipta alba* has elevated the pain threshold and concomitantly decreased the awareness of the animal to the external stimuli; autopsy finding revealed marked hemorrhagic spots on heart and liver. Longitudinal section of the heart revealed the presence of a blood clot (Fig 1). The study reveals that the extract in high doses produces depression of the CNS menifested by marked reduction in spontaneous motor activity, loss of responsiveness to external auditory and painful stimuli and alteration in the sensation of temperature, touch and pain (Curtis *et al* 1986). Higher concentrations of the aqueous extract of *E. alba* also affect the chemoreceptor, trigger zones which are evident from nausea vomiting, retching/gagging etc. Further more the extract also depresses the repiratory centres which results in the death of animals.

Conclusion

Acute toxicity studies revealed a close similarity between the oral, intravenous and intraperitoneal routes. Oral route was found to be much safe as it exhibited low toxicity as compared to other two routes. Further, the action on the CNS is highly dose dependent.

References

Baqar S R 1989 *Medicinal and Piosonous Plants of Pakistan* pp 179.

Bhargava K K, Krishna N R, Seshadri T S 1970 Isolation of Desmethyl wedelolactone and its glucoside from *Eclipta alba. India Chem* **8** 664-665.

Binyak D, Chakravarty A K 1991 Ecliptal, a new terthienylaldehyde from *Eclipta alba. Indian Chem* **30B** (11) 1052 1053.

Brinda S, Rao G P, Gupta S N 1988 Systematic position of Xanthium, a chemosystematic approach. *Acad Sci India Sect* B **58** (1) 16-18.

Choudri G N Joseph Z 1986 Infraspecific differentiation in *Eclipta alba* Hassk on the shift of equilibrium of amino acid accumulation. *Sci Cult* **52** 127-129.

Curtis D K, Marry O A, John D 1986 *Casaratte & Doull's Toxicology*. Macmillan Publishing Company, New York 3rd ed pp 330-359.

Dhar M L, Dhar M M, Dhawan B N, Melhotra B N C 1968 Screening of Indian medicinal plants for biological activity. *Indian Exptl Biol* **6** (part 1) 223-226.

Franca S C, Bertoni B W, Pereira A M S 1995 Antihepatotoxic agent in micro-propagated plantlets of *Eclipta alba. Plant Cell, Tissue Organ Cult* **40**(3) 297-299.

Handa S S, Sharma A, Chakraborti K 1986 Natural products and plants as liver protecting drugs. *Fitoterapia* **57**(5) 807.

Khastighar H N, Sengupta H N, Sengupta K L 1958 Chemical investigation on the leaves of *Gymnema sylvestre R. Br J Ind Chem Soc* **35** 360.

Kirtikar K R, Basu B D 1953 *Indian Medicinal Plants*. Lalit Mohan Basu, Allahabad, India Vol 2,2nd ed pp 1361-1363.

Magre K, Vohra K K, Seth U K 1981 Effect of *Picroohiza kurrooa* and *Eclipta alba* on Na and K Atpase in hepatic injury by hepato toxic agents. *Indian J Pharmacol* **13** 253-259.

Mehra P N, Handa S S 1968 Pharmacognosy of Bhringrjaantihepatotoxic drug of Indian Origin. *Indian J Pharmacol* **30** 284.

Mohammad Ali, Jyoti G 1997 Phytochemical investigation of *Eclipta alba. Orient J Chem* **13** (1) 91-92.

Nadkarni K M 1954 *Indian Materia Medica.* Popular Book Dept, Bombay, India Vol 1 pp 421-422.

Nilamadhab Das, Bhavsar G C, Chohan M G 1990 Spectrophotometric determination of hepatoprotective principles of *Eclipta alba. Indian Drugs* **28** (2) 100-102.

Sarg T M, Abdel-Salam N A, EL-Domiaty M, Khafagy S M 1981 The steriod, triterpenoid and flavonoid constitu-

ents of *Eclipta alba* Hassk (Compositae) grown in Egypt. *Sci Pharm* **49** (3) 262-264.

Sastri 1953 *The Wealth of India, Raw Materials.* Council of Scientific and Industrial Research, New Delhi part-III pp127-128.

Satyavati G V, Ashok Gupta, Neeraj T K 1987 *Medicinal Plants of India.* Cambridge Printing Press, New Delhi Vol-I pp 368-370.

Sikorira B C, Srivastava S J, Niram-Jan G S 1982 Phytochemical studies on *E alba. J Indian Chem Soc* **59** 7 905.

Turner R A 1965 Screening method in Pharmacology In: *Quantal Responses, Calculation of the Ed*-50. Academic Press New York and London pp 62-63.

Vijay S, Kavita M, Meena S, Nag T N 1987 Nutritional aspects of dried terrestrial plants grown in arid zone of Rajastan. *Geobios* **14**(16) 274-276.

Walter M B, Do-Nasimento, Maria C P J, De-Silva M H, Melo P A, Saurex K G 1989 Neutralization of lethal and myotoxic activities of South American rattle snake venom by extract and constituents of the plant *Eclipta prostrata. Toxicon* **27** 1003-1009.

Yokogawa T, Tanaka N, Yagi E, Sakamoto O 1997 Cosmetics containing tyrosinase inhibiting plant extracts for prevention of sun light related skin pigmentation. *Jp Appl* 95/200467. (C.A.).

Zhang S 1990 Tooth paste containing medicinal plant extracts and vitamins for controlling grey hairs. (C.N. 1039535) (CL.A61K7/26).

Zhengheng O U, Gao-Wanyu, Song Yicheng 1989 Hair tonics, shampoos containing herbal medicine and substances promoting active ingredients permeation. C.N. 1031, 022. (CL.A61K.7/06).