



EVALUATION OF ACUTE TOXICITY STUDY FOR EUPHORBIA HIRTA

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Abstract: The present study investigated the acute toxicity of *Euphorbia hirta* plant material in Swiss mice. The plant material was administered orally at dose ranging from 2gm to 10gm/Kg body weight of the plant material in the form of slurry. The animals were observed continuously for the first 4 hours for any behavior changes and they were then kept under observation up to 14 days after administration of the plant material as drug to find out the mortality. From the observations it is concluded that *Euphorbia hirta* plant material at doses of 10 g/kg body weight is nontoxic since no marked changes in behavioral, food and water intake were observed. The *Euphorbia hirta* plant material was found to be safe. No lethality or adverse toxic signs were seen during the experimental study period and during 14 days observation period. No delayed toxic signs were reported in all experimental groups. These findings of this study suggest that the *Euphorbia hirta* could be relatively safe when administered orally in Swiss mice.

Keywords: *Euphorbia hirta*, Acute Toxicity, Mortality, Swiss Mice

INTRODUCTION

Ayurveda is practiced in India since time immemorial as it is being cheap and easily available, Ayurvedic drugs are considered as safe. Moreover, there is surge in the interest in Ayurveda due to quest of alternative medicines. In Ayurvedic system of medicine, Polyherbal formulations were frequently used to enhance the activity or counteract the toxic effect of compounds, from other plants, but may also act synergistically with other constituents from the same plants[1-5].

The oldest remedies known to mankind are herbal medicines. India is known worldwide for its Ayurvedic treatment. *Euphorbia hirta* is often used traditionally for female disorders, respiratory ailments (cough, coryza, bronchitis, and asthma), worm infestations in children, dysentery, jaundice, pimples, gonorrhea, digestive problems, and tumors. It is reported to contain alkanes, triterpenes, phytosterols, tannins, polyphenols, and flavanoids. This review describes the medicinal properties, chemical constituents, and other important aspects of *Euphorbia hirta*[6-9].

Extracts of *E. hirta* have been found to show anticancer activity. The aqueous extract of the herb strongly reduced the release of prostaglandins I₂, E₂, and, D₂. The aqueous extract also inhibits aflatoxin contamination in rice, wheat, maize, and mustard crops. Methanolic extract of leaves have antifungal and antibacterial activities. The leaves pounded with turmeric and coconut oil are warmed and rubbed on

itchy soles. The latex of *E. hirta* is applied on lower eyelids, like *surma* to cure eye sores. The root exudate exhibits nematicidal activity against juveniles of *meloidogyne incognita*.

Decoction of dry herbs is used for skin diseases. Decoction of fresh herbs is used as gargle for the treatment of thrush. Root decoction is also beneficial for nursing mothers deficient in milk. Roots are also used for snake bites. The polyphenolic extract of *E. hirta* has antiamebic and antispasmodic activity. Quercitrin, a flavanoid glycoside, isolated from the herb showed an antidiarrheal activity. It is reported to have a relaxation effect on respiration. The alcoholic extract of whole plant shows hypoglycemic activity in rats. It has a sedative effect on the genitor-urinary tract.

Toxicity is the fundamental science of poisons. The organization for Economic and Development (OECD) mentioned acute toxicity as the advance effect occurring within a short time of oral administration of a simple dose of a substance or a multiple doses given within 24 hours. Phytochemical interactions of poisons lead to injury or death of living tissues. Toxicology is like science and an art like medicine. It includes observational data gathering and data utilization to predict outcome of exposure in human and animals. The ancient humans categorized some plants as harmful and some as safe[16-27].



All organisms are exposed constantly and unavoidably to foreign chemicals or xenobiotics, which include both manmade chemicals such as drugs industrial chemicals pesticides, pollutants pyrolysis products in cooked foods, alkaloids secondary plant metabolites, and toxins produced by moulds, plants and animals. Poisons are any agent capable of producing a deleterious response in a biological system, seriously injuring function or producing death. Toxicologists usually divide that exposure of animals into four categories which are acute, sub acute, sub chronic and chronic. The aim of the present work is to study the toxic effect of *Euphorbia hirta* in the form of powder of aerial parts as well as fresh juice of leaves [10].

MATERIALS AND METHODS

Plant Material:

The plant material of *Euphorbia hirta* was collected from Avsari Forest Park, Ambegaon, Pune, Maharashtra, India. After collection of the required quantity of plant material, it was carefully segregated and dried in shade to a constant weight. The plant material was kept in preset oven for a week at 40°C and powdered in high speed electronic mixer and sieved through a BSS Mesh No. 85 sieve and stored in an airtight container with all specifications like date of collection, weight, humidity etc. This plant material was used for study as per the study protocol given in Table 1.

Table 1: Study Protocol

Name of the study	Acute toxicity study
Test material	<i>Euphorbia hirta</i> plant material as powder of leaves.
Animal model	Albino Swiss Mice
Animals procured from	Raj Biotech (INDIA) Ltd., Pune
Sex	Male and Female
Weight range of animals	Between 30 to 50 g
No. of dose groups	Four groups
Animals per group	1 male and 1 female
Route of administration	Intragastric administration with the help of gavage No. 16
Dose volume	2.0 ml per animal
Vehicle	Distilled water
No. of administrations	Single
Concentration of dose	2, 4, 6, 8 and 10g/Kg body weight plant material
Study duration	Acclimatization for 14 days, one day drug administration and 14 days observation period including holidays
Parameters observed	Cage side observations, daily food and water intake, daily body weight and daily mortality record etc

Animal Maintenance:

All animals were housed in polyurethane cages. The cages were provided with wheat husk bedding and were cleaned daily. The animals were provided with drinking water *ad libitum* and were fed on commercially available Mice feed supplied by Amrut

Feed. The specifications of the feed are listed below in Table 2. The feed was enriched with stabilized vitamins such as Vit. A and D₃, Vit. B₁₂, Thiamine, Riboflavin, Folic acid and supplemented with all minerals and microelements. Measured quantities of water and feed were supplied daily in each cage. The consumption of water and food was recorded from the amount of water left in the feeding bottles and from the amount of feed left in the feed hopper [28, 29].

Table 2: Composition of Feed

Name	Percentage
Crude Protein	20 - 21 % minimum.
Ether Extractive	04 - 05 % minimum.
Crude Fiber	04 % maximum.
Ash	08 % maximum.
Calcium	1.2%.
Phosphorus	0.6 % minimum.
NFE	54 %.
ME Kcal/Kg	3600.
Pallet Size	12 mm.

RESULTS AND DISCUSSION

Cage Side Observations:

The examination of the behavior of animals was reported by recording general observations of each animal on a daily basis from the stage of dosing to the end of the study. Any changes or abnormalities recorded could be an indication of toxicity. The test animals at all dose levels of leaves powder showed no significant changes in behavior before and after the administration. Table 3 shows the dosage regime for *Euphorbia hirta* Table 4 shows the general cage side observations for all parameters studied. Table 5 shows the mortality record for plant powder

Table 3: Doses Regime

Sr. No.	Sex	Dose g/Kg Body weight	No. of animals	administered Vol. in cm ³
1	Male	2	1	2
2	Female	2	1	2
3	Male	4	1	2
4	Female	5	1	2
5	Male	6	1	2
6	Female	6	1	2
7	Male	8	1	2
8	Female	8	1	2
9	Male	10	1	2
10	Female	10	1	2

Body Weight Changes:

Body weight is an important factor to monitor the health of an animal. Loss in body weight is frequently the first indicator of the onset of an adverse effect. A dose, which causes 10% or more reduction in the body weight, is considered to be a toxic dose. It is considered to be the dose, which produces minimum toxic effect, irrespective of whether or not it is accompanied by any other changes. All the animals from treated groups did not show any significant decrease in body weights for all the 14 days as

compared with the zero day values. There was no significant change in food and water intake of the test animals at all dose levels of the plant material and extract for all days[11-17].

Table 4: Cage Side Observations for All Animals

Sr. No.	Parameters	Cage Side Observations
1	Condition of the fur	Normal
2	Skin	Normal
3	Subcutaneous swellings	Nil
4	Abdominal distension	Nil
5	Eyes –dullness	Nil
6	Eyes – opacities	Nil
7	Pupil diameter	Normal
8	Ptosis	Nil
9	Colour & consistency of the faeces	Normal
10	Wetness or soiling of the perineum	Nil
11	Condition of teeth	Normal
12	Breathing abnormalities	Nil
13	Gait	Normal

Table 5: Mortality Record for plant material as aqueous slurry

Group	2g/Kg	2 g /Kg	4 g /Kg	4 g /Kg	6 g /Kg	6 g /Kg	8g /Kg	8 g /Kg	10 g /Kg	10 g /Kg
Sex	M	F	M	F	M	F	M	F	M	F
Hr. 1	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Hr. 2	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Hr. 3	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Hr. 4	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Day 1	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Day 2	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Day 3	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Day 4	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Day 5	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Day 6	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Day 7	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Day 8	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Day 9	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Day 10	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Day 11	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Day 12	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Day 13	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Day 14	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Mortality	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1

Mortality:

Mortality is the main criteria in assessing the acute toxicity (LD₅₀) of any drug. There was no mortality recorded even at the highest dose level i.e. 10g/K body weight plant material of *Euphorbia hirta*.

CONCLUSION

In this study acute toxicity was determined as per guidelines. It was also observed that there was no mortality in any of the dose up to 10gm/kg body weight plant material. The administration of this plant material did not show any significant changes in the body weight, indicating that it did not have any adverse effects on body weight. All groups were almost

continuously observed for mortality and behavioral changes during first 24 hr and then daily for a fortnight. There was no abnormality observed in any of these groups.

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