

**ORAL TOXICITY STUDY OF *VERNONIA CINEREA* AQUEOUS LEAF EXTRACT IN SWISS ALBINO MICE****\*Dr. S. N. Suresh, Varsha V. and Prejeena V.**

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**ABSTRACT**

The study aimed to check for the toxicity effect of *Vernonia cinerea* leaf aqueous extract in Swiss Albino mice at different dosage levels. The extract was administered orally at dose levels of 5 mg/kg, 50 mg/kg, 300 mg/kg, 1000 mg/kg and 2000 mg/kg. Clinical and behavioural signs were observed for 14 days. The animals were checked for mortality during the study period. Home cage activities and hand-held observations were noted to analyse changes in the mice during the administration period of the plant extract. The results revealed that *Vernonia cinerea* aqueous leaf extract was safe up to 2000 mg/kg dose levels in mice. No changes in behavioural and

clinical signs were observed. No mortality was seen after administration of *Vernonia cinerea* leaf extract.

**KEYWORDS:** Toxicity, *Vernonia cinerea*, Aqueous, Swiss Albino mice, Mortality.

**INTRODUCTION**

Medicinal plants are invaluable in health care system of each community. They possess bioactive secondary metabolites that protect the plants. These bio compounds have medicinal properties which could prevent and treat certain diseases including serious illness. Herbal preparations and medicines are still used widely by different communities around the world, but lack scientific evidences. Research on rich sources of our natural plant system leads to the development of drugs that are safer compared to synthetic drugs. The toxic effects of plants need to be tested before administration. Certain plants are found to have side effects when administered at high dose. Toxicology deals with the analysis of adverse effects of a plant

extract when administered at different dose levels. The study helps in determining the dose of a plant extract to be used.<sup>[1]</sup> *Vernonia cinerea* is a perennial plant belonging to Asteraceae family with pinkish flowers seen commonly in Asian and African countries. The whole plant is known to have many medicinal values, it is used in many ayurvedic medicines and consumed as food in southern part of India.<sup>[2]</sup> The leaves of *Vernonia cinerea* lacks scientific studies, hence the present work was carried out to determine the toxicity levels of *Vernonia cinerea* aqueous leaf extracts at different dose levels in Swiss Albino mice.

## MATERIALS AND METHODS

### Collection of Plant Material

Fresh leaves of *Vernonia cinerea* were collected from different parts of Kerala and authenticated from Botanical Survey of India, Coimbatore, Tamil Nadu, India. The plant specimen was identified as *Vernonia cinerea* (L.) Less (BSI/SRC/5/23/Tech/2496).

### Acute Toxicity Study of *Vernonia cinerea* Leaves in Swiss Albino Mice

#### Animals

A total of 15 mice with an approximate age of 6 weeks were purchased from M/S. Venkateshwara Enterprises Pvt. Ltd, Bangalore. On their arrival a sample of animals was chosen at random and weighed to ensure compliance with the age requested. The mean weights of animals were 20-25g respectively. The animals were housed in metabolic cages (55 x 32.7 x 19 cm), with sawdust litter, in such a way that each cage contained a maximum of 3 animals. All animal procedures were performed after approval from the IAEC (Institution of Animal Ethical Committee IAEC NO: KMCRET/PhD/11/2016-17) and in accordance with the CPCSEA recommendations for the proper care and use of laboratory animals.<sup>[3]</sup>

#### Administration Route and Procedure

The test substance was administered orally. The animals belonging to the control group were treated with the vehicle (Water) at the same administration volume as the rest of the treatment groups.

#### Doses

The doses for the study were selected based on literature search and range finding study. Following the period of fasting, the animals were weighed and then drug was administered

orally as single dose using a needle fitted onto a disposable syringe of approximate size at the following different doses.

**Table 1: Doses of Plant Extract.**

Group	Dose (mg/Kg)
I	5
II	50
III	300
IV	1000
V	2000

The test sample was administered as single dose. After single dose administration period, all animals were observed for 14 days.

### Observation Period

All animals were observed for any abnormal clinical signs and behavioural changes, appearance, change and disappearance of these clinical signs. If any, were recorded for approximately 1<sup>st</sup>, 3<sup>rd</sup> and 4<sup>th</sup> hour post-dose on day of dosing and once daily thereafter for 14 days. Animals in pain or showing severe signs of distress were humanely killed. The cage side observation included changes in skin, fur, eyes and mucous membranes, occurrence of secretions and excretions. Autonomic activity like lacrimation, piloerection, pupil size and unusual respiratory pattern, changes in gait, posture, response to handling, presence of clonic or tonic movements, stereotypes like excessive grooming and repetitive circling or bizarre behaviour like self-mutilation, walking backwards etc were observed. At the 14th day, sensory reactivity to stimuli of different types was conducted. Auditory stimuli responses were measured by clicker sound from approximately 30 cm to the mice; visual stimuli responses were measured with the help of shining pen light in the eye of mice and placing a blunt object near to the eye of mice. Response to proprioceptive stimuli was measured by placing anterior/dorsal surface of animal paw to the table edge.<sup>[4]</sup>

### Mortality and Morbidity

All animals were observed daily once for mortality and morbidity at approximately 1<sup>st</sup>, 3<sup>rd</sup> and 4<sup>th</sup> hour post dose on day of dosing and twice daily thereafter for 14 days.

## RESULTS

From acute toxicity study it was observed that the administration of aqueous leaf extracts of *Vernonia cinerea* up to dose levels of 2000 mg/kg to the mice do not produce drug-related

toxicity and mortality. So, No-Observed-Adverse-Effect- Level (NOAEL) of *Vernonia cinerea* is 2000 mg/kg. All animals were observed daily once for any abnormal clinical signs. Weekly body weight and food consumption were recorded. No mortality was observed during the entire period of the study. Data obtained in this study indicated no significant physical and behavioural sign (Table. 2) of any toxicity due to administration of *Vernonia cinerea* at the doses of 5mg/kg, 50mg/kg, 300mg/kg, 1000mg/kg and 2000mg/kg to mice.

**Table 2: Physical and Behavioural Examinations.**

Group No.	Dose (mg/kg)	Observation sign	Number of animal affected
Group-I	5	Normal	0 of 3
Group- II	50	Normal	0 of 3
Group-III	300	Normal	0 of 3
Group-IV	1000	Normal	0 of 3
Group-V	2000	Normal	0 of 3

At the 14th day, all animals were observed for functional and behavioural examination (Table 3 and Table 4). Functional and behavioural examination was normal in all treated groups. Food consumption of all treated animals was found normal as compared to control group. The responses of reactions for these three exercises were normal in animals belonging to both the control as well as plant extract treatment dose groups. Mortality was not observed in the control and *Vernonia cinerea* leaf extracts treated animal groups, thus confirming that the leaf extracts did not produce any toxic effects up to dose levels of 2000 mg/kg.

**Table 3: Home Cage Activity.**

Functional and Behavioural observation	Observation	5mg/kg (Group-I)	50mg/kg (Group-II)	300mg/kg (Group-III)	1000mg/kg (Group-IV)	2000mg/kg (Group-V)
		mice n=3	mice n=3	mice n=3	mice n=3	mice n=3
Body position	Normal	3	3	3	3	3
Respiration	Normal	3	3	3	3	3
Clonic involuntary Movement	Normal	3	3	3	3	3
Tonic involuntary Movement	Normal	3	3	3	3	3
Palpebral closure	Normal	3	3	3	3	3
Approach response	Normal	3	3	3	3	3
Touch response	Normal	3	3	3	3	3
Pinna reflex	Normal	3	3	3	3	3
Pinna sound	Normal	3	3	3	3	3
Tail pinch response	Normal	3	3	3	3	3

Table 4: Hand Hel Observations.

Functional and Behavioral observation	Observation	Control	5 mg/ kg (Group-I)	50 mg/kg (Group-II)	300mg/kg (Group-III)	1000mg/kg (Group-IV)	2000mg/kg (Group-V)
		mice n=3	Mice n=3	Mice n=3	Mice n=3	Mice n=3	Mice n=3
Reactivity	Normal	3	3	3	3	3	3
Handling	Normal	3	3	3	3	3	3
Palpebral closure	Normal	3	3	3	3	3	3
Lacrimation	Normal	3	3	3	3	3	3
Salivation	Normal	3	3	3	3	3	3
Piloerection	Normal	3	3	3	3	3	3
Pupillary reflex	Normal	3	3	3	3	3	3
Abdominal tone	Normal	3	3	3	3	3	3
Limb tone	Normal	3	3	3	3	3	3

## DISCUSSION

To develop an effective natural drug, the toxicity has to be explored similarly like synthetic drugs. The traditional herbal medicines need to be checked for its toxic effects to reduce risk and its side effects.<sup>[5]</sup> Administration of aqueous extract of *Vernonia cinerea* leaves did not shows any toxic effects in mice. Similar results was reported in a study where the safety of ethanol extract of *Vernonia cinerea* whole plant was evaluated by determining its toxicity after acute and chronic administration in rats. In the acute study no toxicity or death was observed at the dose of 2000mg/kg and in chronic toxicity no significant changes in haematological, hepatic and renal parameters were seen.<sup>[6]</sup>

## CONCLUSION

The study indicates that aqueous extract of *Vernonia cinerea* leaves do not possess toxicity effects in mice and hence it could be concluded that *Vernonia cinerea* leaf extract is safe for administration at dose level of 2000 mg/kg and will not pose side effects up to this dose level.

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