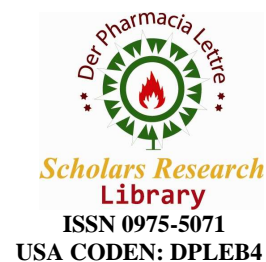




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Evaluation of acute toxicity for *Abutilon indicum*

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ABSTRACT

The present study investigated the acute toxicity of *Abutilon indicum* plant material in Swiss mice. The plant material was administered orally at dose ranging from 2gm to 10gm/Kg body weight as well as 10g/Kg body weight plant material as well as 10ml/Kg juice of fresh leaves and 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 drug administration to find out the mortality. From the results it is concluded that *Abutilon indicum* plant material at doses of 10 g/kg as well as 10 ml/Kg is nontoxic since no marked changes in behavioral, food and water intake were observed. The *Abutilon indicum* plant material was found to be safe. No lethality or adverse toxic signs were seen during the experimental period and during 14 days observation period. No delayed toxic signs were noted in all experimental groups. These findings suggest that the *Abutilon indicum* could be relatively safe when administered orally in Swiss mice.

Keywords: *Abutilon indicum*, 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. *Abutilon indicum* is a small shrub, native to tropic and subtropical regions and sometimes cultivated as an ornamental.[2] This plant is often used as a medicinal plant and is considered invasive on certain tropical islands.[1]

In traditional medicine, *A. indicum* is used as a demulcent, aphrodisiac, laxative, diuretic, pulmonary and sedative (leaves). The bark is astringent and diuretic; laxative, expectorant and demulcent (seeds); laxative and tonic, anti-inflammatory and anthelmintic (plant); analgesic (fixed oil); diuretic and for leprosy (roots)[3]. The whole plant is uprooted, dried and is

powdered. In ancient days, maidens were made to consume a spoonful of this powder with a spoonful of honey, once in a day, for 6 months until the day of marriage, for safe and quick pregnancy. The leaves can also be used to treat ulcers, headaches, gonorrhoea and bladder infection.[3]

The plant is very much used in Siddha medicines. In fact, the root, bark, flowers, leaves and seeds are all used for medicinal purposes by Tamils. The leaves are used as adjunct to medicines used for pile complaints. The flowers are used to increase semen in men.[4] A methanol extract of *A. indicum* had some antimicrobial properties.[5] A chemical compound, β -sitosterol, which has been identified as the active ingredient in many medicinal plants, is present in *A. indicum* and a petroleum ether extract provided larvicidal properties against the mosquito larvae *Culex quinquefasciatus*. [6]

Atibala is used externally, to alleviate the pain and swelling. Internally, the roots and seeds are used for medicinal purpose. In tuberculosis, with cavitation, atibala is valuable as it nourishes the mamsa dhatu (muscle tissue) and augments the strength. It also augments the seminal fluids and normalizes the sukra ksaya, which many a times is a cause of tuberculosis according to Ayurvedic concept. Atibala is salutary in raktapitta to arrest the bleeding tendencies. It is useful as an adjunct in vata diseases like paralysis, facial palsy, cervical spondylosis etc. The diuretic like property of the plant is useful in urinary disorders.

Toxicity is the fundamental science of poisons. The organization for Economic and Development (OECD) mentioned acute toxicity as the adverse 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 [7- 9].

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 *Abutilon indicum* 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 *Abutilon indicum* was collected from Avsari Forest Park, Ambegaon, Pune, Maharashtra, India. After collection of the required quantity of plant material, it was carefully segregated, cut down into small pieces 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>Abutilon indicum</i> plant material as well as fresh juice 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 as well as 2ml/Kg to 10ml/Kg body weight fresh juice of leaves
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.

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 and methanol extract showed no significant changes in behavior before and after the administration. **Table 3** shows the dosage regime for *Abutilon indicum* **Table 4** shows the general cage side observations for all parameters studied. **Table 5** and **Table 6** show the mortality record for plant powder and fresh juice of leaves of *Abutilon indicum*.

Table 3: Doses Regime

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

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

Table 6: Mortality Record for fresh juice of leaves as aqueous slurry

Group	2ml/ Kg	2 ml /Kg	4 ml /Kg	4 ml /Kg	6 ml /Kg	6 ml /Kg	8 ml /Kg	8 ml /Kg	10 ml /Kg	10 ml /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

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.

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 (10ml/Kg) body weight plant material of *Abutilon indicum*.

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. 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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