Acute toxicity studies of Some Indian Medicinal plants.

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ABSTRACT

It is presumed that ayurvedic drugs have lesser side effects as compared to allopathic drugs. For the safety to use these plants and preparations (gel and powder forms), the medicinal plants need to be evaluated for their toxicity. The aim of this study was to test the acute toxicity of three medicinal plants, *Terminalia bellerica* (Gertn.) Roxb. fruits, *Moringa pterigosperma* (Gaertn) leaves, *Cassia tora Linn*.leaves. The acute toxicity study was studied on Swiss mice with a dose of 3 and 5 g/Kg body weight orally. The single administration exposure of the whole plant powder in the form of aqueous slurry on Swiss mice was carried out and the exposure route was oral with water as a vehicle. The observations of changes in body weight, food and water intake as well as cage side observations were reported. The plants were found to be nontoxic

Keywords: *Terminalia bellerica*, *Moringa pterigosperma*, *Cassia tora*, acute toxicity.

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INTRODUCTION

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. Phychochemical 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 & data utilization to predict outcome of exposure in human and animals. The ancient humans categorized some plants as harmful and some as safe. [1] In the recent years, attention has been focused at the traditional (Herbal) way of therapy. It is presumed that Ayurveda Medicines (drugs), which is popular in our country, have lesser side effects as compared to allopathic drugs. Therefore, considerable attention has been directed towards identification of plants with no toxicity that may be used for human consumption.

Terminalia bellerica Roxb. (family: Combretaceae), commonly known as belleric myrobalan and locally known as beheda, is an edible plant found throughout Central Asia. [2] Its fruit has been used in traditional medial system for anemia, asthma, cancer, colic, constipation, diarrhoea, dysuria, headache, hypertension, inflammations, and rheumatism. [3,4] Terminalia bellerica is known to lower the lipid levels in hypercholesterolemic animals.[5] *Moringa pterigosperma* Gaertn. (Moringaceae) Leaves are anti inflammatory, anodyne, anthelmintic, ophthalmic and rich in vitamins A and C. [5] Reports indicate that pharmacological activites of *Moringa pterigosperma* (Gaertn) leaves includes antitumour, radioprotective, antihypertensive, hypoglycemia, diuretic and hypocholestemia activities [6] and diabetes. [7]Cassia Tora L., (Cassia obtusifolia L.), Caesalpiniaceae,is a wild crop and grows in most parts of India According to Ayurveda the leaves and seeds are acrid,laxative, antiperiodic, anthelmintic, ophthalmic, liver tonic, cardiotonic and expectorant. The leaves and seeds are useful in leprosy, ringworm, flatulence, colic, dyspepsia, constipation, cough, bronchitis, cardiac disorders. [8]

MATERIAL AND METHODS

Plant material

The *Terminalia bellerica (Roxb.)* fruits were collected from Govali village, Kalyan, Thane district, Maharastra, India. The plant material was taxonomically identified by Blatter Herbarium St Xavier's College, Mumbai. A voucher specimen (No. T-1114 of S.C. Tavakari) has been preserved in a laboratory for further reference. The leaves of *Moringa pterigosperma* (Gaertn) and Cassia Tora

Table 1 : Dosage regimen for acute toxicity study

Group	Sex	Plant	Dose g/kg body weight	No. of animals used	Total volume administered
I	Male	Terminalia bellerica	2.0	4	0.5
II	Male	Terminalia bellerica	5.0	4	0.5
III	Male	Moringa oleifera	2.0	4	0.5
IV	Male	Moringa oleifera	5.0	4	0.5
V	Male	Cassia tora	2.0	4	0.5
VI	Male	Cassia tora	5.0	4	0.5

L., were collected from Birla college campus, Kalyan, Thane district, Maharastra, India. The plant material was taxonomically identified by Blatter Herbarium St Xavier's College, Mumbai. A voucher specimen (No. 4891 of N.A Irani and No. 4455 of N.Y. Das) has been preserved in a laboratory for further reference. The collected plant material was dried under shade and powdered with a mechanical grinder and stored in an air tight container. The dried powder material of was soaked in distilled water and the slurry thus obtained was used further.

Animal maintenance

30 male Swiss albino mice of body weight from 25-30 g were procured from Haffikine Institute, Parel. The animals were housed in polypropylene cages in air conditioned room with controlled temperature and alternating 12 hour periods of light and dark were maintained. The animals were acclimatized to standard laboratory conditions prior to experimentation. The guidelines issued by Institutional Animal Ethics Committee of Ramniranjan Jhunjhunwala College, Ghatkopar, with CPCSEA registration no. 525/02/a/CPCSEA regarding the maintenance and dissection of small animals were strictly followed.

Composition of diet

The aminals were fed on the standard pellet diet (Amurt Feed, Pune), and water was given *ad libitum*. The standard pellet diet comprised 20% protein, 5% lipids, 4% crude fibre, 8% ash, 1% calcium, 0.6% phosphorus, 3.4% glucose, 2% vitamins and 55% nitrogen free extract (carbohydrates).

The dosage regimen for acute toxicity study (Table1)

Acute Toxicity Study

Toxicity study of Terminalia bellerica, Moringa oleifera, Cassia tora was carried out by using mice as the experimental model. The study was carried out to assess the acute toxicity of the plant slurry on oral administration. The study was carried out as per the details laid down in OECD guidelines 420 viz, fixed dose procedure (Evident toxicity)

Protocol*:-*

1. Animal species/ strain	Albino Swiss mice.
2. Sex	Male.
3. Body weight	25–30.
4. Animal procured from	Haffikine Institute, Parel, Mumbai.
5. No. of doses groups	6
6. Animals per group	4
7. Route of administration	Oral via gauage.
8. Vehicle of administration	Distilled water
9. Volume of administration	Not more then 2ml as combined volume of plant sample and vehicle.
10. Dosing details	Refer to dosing chart.
11.Observation period	14 days post dose and 7 days prior to dosing.

More clinical observation such as condition of fur, damage area of skin, subcutaneous swelling or lumps, abdominal detension, eye dullness, eye opacity, pupil diameter, ptosis (drooping of upper eyelid), colour and condition of faeces, wetness or soiling of perineum, condition of teeth, breathing abnormalities, gait should be recorded as indication of toxicity.

Statistical analysis

Experimental results are expressed as means ± SD.

RESULTS AND DISCUSSION

Clinical Observation

Assessment of the behavior of animals was carried out by 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 showed no significant changes in behavior before and after the administration of an oral dose of whole plant powder as slurry. The clinical observation detailed below is in general for the 3 plants material under investigation.

1.Condition of fur	Normal
2.Damage area of skin	Normal
3.Subcutaneous swelling or lumps	Normal
4.Abdominal detension	Normal
5.Eye dullness	Normal
6.Eye opacity	Normal
7.Pupil diameter	Noraml
8.Ptosis (drooping of upper eyelid).	Normal
9.Colour and condition of faeces	Normal
10.Wetness or soiling of perineum	Nil
11.Condition of teeth	Normal
12.Breathing abnormalities	Normal
13.Gait	Nil

1.Body weight changes

Body weight is an important factor to monitor the health of the animal. The loss of body is frequently the first indicator of the onset of an adverse effect. A dose, which causes 10%or more reduction in 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 weight for all the 14 days as compared with the 0 day it thus indicating no signs of toxicity (Table 2).

2. Food and water consumption

There was no significant change in food and water consumption(Table 3 and 4).

3. Mortality

Mortality is the main criterion in assessing the acute toxicity (LD50) of a drug. There was no mortality recorded even at the highest dose level i.e.5g/kg body weight of all the groups.

CONCULSION

From the results of this study it is observed that there is no significant change in body weight, food and water consumption by the Albino Swiss mice from all the dose groups. There was no mortality recorded even a the highest dose level i.e.5g/kg body weight, which proves that all Terminalia bellirica Roxb., Moringa oleifera Lam.,

Table 2 :. Acute toxicity studies *on Terminalia bellirica* Roxb.(I, II), *Moringa pterigosperma* Gaertn. (III, IV) *Cassia tora Linn.*(V, VI), –Body weight (g)

Days	I	II	III	IV	V	VI
Day 0	30	26	30	26	27	25.8
Day 1	30	26	30	26	27	25.8
Day 2	30	25	29.9	26.1	26.6	25.7
Day 3	29.9	24	29.8	26	26.7	25
Day 4	29	25	30.1	26	26.7	25
Day 5	29	24	30	26	28	25
Day 6	29	26	30	26.5	27	25
Day 7	29.8	26	29	26.4	27	25
Day 8	29.8	26.1	28	26	26.6	25
Day 9	29.9	25.9	28.8	26	27	26
Day 10	29.9	25.5	28.8	27	27	26
Day 11	29.9	26	29	27	27	26
Day 12	29.9	25	30	27	27	26
Day 13	30	26	30	26	27.1	26
Day 14	30	26	31	26	27	26

Note: All values expressed as average weight of animals in each group. The number of animals in each group is four.

Table 1.: Acute toxicity studies on Terminalia bellirica Roxb.(I, II), Moringa oleifera Lam.(III, IV) Cassia tora Linn.(V, VI), –Food intake (g)

Days	I	II	III	IV	V	VI
Day 0	22	17	21	19	16	20
Day 1	16	18	23	18	17	21
Day 2	20	17	21	19	17	21
Day 3	20	16	20	18	19	22
Day 4	18	15	19	19	23	22
Day 5	18	17	18	20	20	22
Day 6	19	18	18	19	18	22
Day 7	19	18	19	18	17	21
Day 8	20	20	18	16	18	15
Day 9	20	20	19	16	16	15
Day 10	20	18	20	16	16	15
Day 11	21	19	20	19	15	15
Day 12	21	17	21	19	15	22
Day 13	22	18	21	18	16	21
Day 14	22	17	21	19	16	21

Note: All values expressed as weight of food consumed by each group,from a known weight of food provided .The number of animals in each group is four.

Table 4.: Acute toxicity studies on Terminalia bellirica Roxb.(I, II), Moringa oleifera Lam.(III, IV) Cassia tora Linn.(V, VI), –Water intake (g)

Days	I	II	III	IV	V	VI
Day 0	21	17	24	20	22	15
Day 1	21	13	23	20	16	17
Day 2	22.3	11	23	20	18	18
Day 3	23	20	24	21	19	16
Day 4	20	17	23	22	18	17
Day 5	19	13	20	23	19	16
Day 6	20	17	20	21	19	14
Day 7	20	20	21	22	21	11
Day 8	18	17	23	23	20	13
Day 9	16	21	20	23	20	14
Day 10	19	19	21	14	15	12
Day 11	18	18	20	19	17	11
Day 12	18	19	20	19	18	13
Day 13	18	17	23	19	18	14
Day 14	17	20	24	19	20	15

Note: All values expressed as ml of water consumed by each group, from a known weight of food provided .The number of animals in each group is four.

Cassia tora Linn. have no toxic effect in Albino Swiss mice. The results have indicated that these plants are safe and can be used for efficacy studies.

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