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Evaluation of Acute Toxicity of Plant Gum of Lannea Coromandelica in Mice

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Keywords:

L. coromandelica gum, toxicity studies, morbidity, mortality.

ABSTRACT

The present investigation was carried out to evaluate the safety of gum of *Lannea coromandelica* plant in determining its safety use after conducting acute toxicity studies in mice. For the acute toxicity study, gum was administered to mice by oral route with sterile water as the vehicle. Abnormal changes in general behavior and mortality were determined up to14 days. In the acute toxic study, the gum was administered orally at the limit test dose of 2000 mg/kg in a group of six mice and observed for 14 days. Biochemical and hematological parameters were estimated intermittently till the last day of the experiment. No morbidity, mortality and further found no phenomenal differences in food, water intake and weight gain in experimental mice after administration of gum of *L. coromandelica*. The results observed in the experiment on various vital parameters showed similar and safe properties on par with naturally available agents such as gum acacia, tragacanths which are very well known established pharmaceutical excipients in the present market.

1. INTRODUCTION

Medicinal plants have become part and parcel of mankind in medical care for the prophylactic and therapeutic activity. Natural products play an active role in the development of novel drugs for the prevention and treatment of disorders[1]. The bioactive principles of medicinal plants are said to be safe without compromising health effect which made worldwide attention for self medication[2].

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However, acute oral toxicity studies are critically important to find out a range of doses and subsequently the use of plant products. Many herbal preparations are non-toxic, many plants which used as medicines have shown to be highly toxic when subjected for acute toxicity studies[3,4]. Therefore, the toxicological investigations on natural herbal products across the globe are increasing day by day.

Aim:

The aim of the present study is an evaluation of acute toxicity of crude gum of *L. coromandelica* in healthy albino mice of either sex as per the OECD guidelines no: 420.

Plant Profile:

The genus Lannea belongs to the family *Anacardiaceae* and consists of 40 species. *L. coromandelica* Linn. is a deciduous tropical tree widely distributed in Bangladesh, India and some other tropical countries. The bark of *L. coromandelica* was used for skin diseases[5], injuries and hematochizia[6], hypotension[7], antifungal and antibacterial[8] agent. The stem bark of this plant was used by the Garo tribes in Madhapur forest region of Bangladesh to treat seminal weakness and excessive seminal emission[9]. The leaf juice was orally taken to relieve ulcers and pain[10].

This tree is a deciduous tree, growing up to 14 m tall. Branch-lets are minutely covered with starry hairs. Alternately arranged leaves are pinnate, with a single terminal leaflet (pinnae) at the end. The spine carrying the leaflets is up to 7 cm long.

Leaflets are usually 5, each laterals opposite, ovate, base rounded, densely velvet-hairy when young. Flowers are unisexual, greenish, the male in compound and female in simple racemes. Sepals 4, about 1 mm long, broadly ovate, petals 4, 2mm long, oblong and green yellow in color. Fruit is ovoid, compressed, in panicles, at the end of leafless branches. Flowering usually takes place in January-March months.

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1.Photograph of leaf

2.Photograph of flower

Materials and Methods:

Collection and Isolation of L. coromandelica gum

Gum exudates were collected by blazing the tree trunk with an axe and collected the exuded gum. The exudates were sticky brown in color, became harder and darker after 15 days and it was cleaned by removing the external bark and other extraneous materials by hand, finally dried in hot air oven at 50^0C. It was powered by using high speed mechanical blender (Maharaja, India) and sifted through the sieve No.100 (nominal mesh aperture size 75 µm). It was dispersed in distilled water in the proportion of one part of plant gum material to ten parts of the distilled water. The extraction process was conducted by continuous stirring using rotary shaker (M/s. Remi Instruments Ltd, Mumbai, India) up to 24 hours at room temperature. The supernatant was separated by muslin cloth. The final residue was washed with water and washings were added to the supernatant. The procedure was repeated two times. The supernatant liquid was collected and treated with twice the volume of acetone to isolate the gum by continuous stirring and it was separated by centrifugation process. The precipitate was formed and washed with acetone and dried at 40-50^0C in hot air oven. The dried *L. coromandelica* gum size is reduced by laboratory blender and passed through sieve No.100. It was stored in a tightly closed container and kept in a desiccator.

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3.Photograph of trunk

4.Photograph of plant with leaf

Methods:

Albino mice were administered at a dose of 2000 mg/kg of gum and the animals were observed for general behavioral changes, side effects, adverse effects or morbidity and mortality studies for 14 days post treatment.

Animals:

Albino mice of either sex, weighing between 20-30 GM was selected for acute toxicity investigation. The animals are provided with food, water and maintained under standard laboratory conditions for 12 hour light-dark cycle at room temperature.

Acute Toxicity Studies:

The investigation of acute toxicity of the gum was carried- out in experimental mice of either sex (20-30 gm) according to economic co-operation and development (OECD) guidelines 420. The animals were fasted for 3 hr and administered with 2000 mg/kg of gum as test samples orally to mice as per Table no:1. All the mice were observed for general behavioral changes, toxic effects and mortality after administration for first 4 hours and then over a period of 24 hours, later for 14 days daily.

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Hematological Parameters:

The heparinised blood was subjected to analysis of hematological parameters such as Hemoglobin (Hb), Red blood cells (RBC) and White blood Cells (WBC) [11].

Table No: 1. Administered doses for test animals (mice)

Animal	Weight of Mice (g)	Wt. of Gum Administered (mg)
Mice 1	23	46
Mice 2	25	50
Mice 3	20	40
Mice 4	24	48
Mice 5	20	40
Mice 6	23	46
Average Wt.	22.50±0.18	----

Results:

Acute Toxicological Studies:

The experimental animals which were administered with the gum at a dose of 2000 mg/kg did not show any clinical signs of toxicity or deaths of mice. The mortality and clinical signs of adverse effects were not recorded throughout the experiment. The qualitative biological, hematological parameters were shown in table 2 and table 3.

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Table 2: Qualitative biological parameters of mice after administration gum of *L. coromandelica*

Parameter Observed	Observation at time									
	30 min	1h	2 h	6 h	24h	3rd Day	6th Day	9th Day	12th Day	14th Day
Activity	N	N	N	N	N	N	N	N	N	N
Depression	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Eye Irritation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Skin Irritation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Sedation	Yes	NO	NO	NO	NO	NO	NO	NO	NO	NO
Limb Paralysis	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Mortality	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Diarrhoea	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Salivation	Yes	Yes	NO	NO	NO	NO	NO	NO	NO	NO
Convulsion	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Tremors	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Writhing	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Respiration	N	N	N	N	N	N	N	N	N	N
Total group average Weight	22.50± 0.71	22.50± 0.43	22.50± 0.81	22.50± 0.63	22.50± 0.73	22.00 ± 0.92	23.00 ± 0.43	23.50 ± 0.66	23.55± 0.74	23.60± 0.62

N-Normal

Table 3: Quantitative hematological parameters of mice after administration gum of *L.coromandelica*

Day	Hematological parameters		
	Hemoglobin (Hb)	RBC Count($X10^6$/ml)	WBC Count($X10^3$/ml)
0 day	13.82± 0.18	4.86 ± 1.25	9.25± 0.41
1 Day	14.13 ± 1.13	5.16 ± 0.99	10.11 ± 0.25
4th Day	14.00± 0.32	3.91 ± 0.56	8.99 ± 0.67
10th Day	14.98±0.23	4.23 ± 0.78	9.19 ± 0.80
14th Day	13.98±0.19	4.99±0.88	9.58±0.87

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Discussion:

The acute toxicity studies of gum of *Lannea coromandelica* have revealed no toxic effect in mice. No morbidity or mortality was observed in experimental conditions. The animals were survived throughout the 14 days observation period. No phenomenal differences in food and water intake, weight gain, biochemical and hematological parameter were observed throughout the study. During this study, the food intake, water consumption was not affected by the administration of gum of *L. coromandelica* and it did not suppress the appetite. The experimental procedure was also conducted with the crude gum of *L. coromandelica*, the same and similar results were observed.

It indicates no interruption of metabolism of carbohydrates, proteins, fats. The body weight was same throughout the experiment.

Conclusion:

According to the results in this experiment on various vital parameters showed similar and save properties of naturally available gums such as gum acacia, tragacanths which are very well known established pharmaceutical excipients in the present market. The crude and purified form of *L. coromandelica* gum produced a similar type of results in the safety range of toxicity studies. From the above acute toxicity studies profile of gum extract of *L. coromandelica* has shown no behavioral changes, no morbidity and no mortality, which clearly indicates that the gum of *L. coromandelica* has a wide range of safety as an excipient in the pharmaceutical industry.

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References

1) Hema Naga Durga Divvela, Lohithasu Duppala and Venkata Ramana Murthy Kolapalli. Isolation and acute oral toxicity studies of *araucaria heterophylla* novel natural polysaccharide gum in albino mice. *World journal of pharmacy and pharmaceutical sciences*, 2016, 5(10): 702-711.
2) Kapoor LD. Handbook of Ayurvedic Medicinal Plants. 1st ed. Boca Raton, London: CRC Press; 2005. p. 18-9.
3) Feres CA, Madalosso RC, Rocha OA, Leite JP, Guimarães TM, Toledo VP, et al. Acute and subchronic toxicological studiesof Dimorphandra mollis in experimental animals. J Ethnopharmacol 2006, 108(3):450-6
4) Mukherjee PK. Quality control of herbal drugs-An approach to evaluation of botanicals. 2nd ed. Business horizon, Kolkata Pharmaceutical Publishers. 2007. p. 688-94.
5) Merlin, F.F. and D. Narasimhan. Plant names and uses as indicators of knowledge patterns. *Indian Journal of Traditional Knowledge*, 2009, 8(4): 645-648.
6) Heda, N. Kamalkishor and Kulkarni, 2009. Fish stupefying plants used by Gond tribal of mendha village of central india, *Indian Journal of Traditional Knowledge*, 8(4): 531-534.
7) Singh, S. and G.B. Singh, 1996. Hypotensive Activity of *lannea coromandelica*Bark Extract. Phytotherapy Research, 10(5): 429-430.
8) Queiroz, E.F., C. Kuhl, C. Terreaux, S. Mavi and K. Hostettmann,. New Dihydroalkylhexenones from *Lannea edulis*. *Journal of Natural Products*, 2003, 66(4): 578-580.
9) Mia, M.M.K., M.F. Kadir, M.S. Hossan and M. Rahmatullah,. Medicinal plants of the Garo tribe inhabiting the Madhupur forest region of Bangladesh. *American-Eurasian Journal of Sustainable Agriculture*. 2009, 3(2): 165-171.
10) Zhenga, X.L and F.X. Xinga,. Ethnobotanical study on medicinal plants around Mt. Yinggeling,Hainan Island, China. *Journal of Ethnopharmacology*. 2009, 124(1): 197-210.