

## Pharmacological Investigation of Acute Oral Toxicity of Ethanolic Extract of *Crossandra infundibuliformis* Linn Aerial Parts in Albino Rats

Hemadharsni.P\*, Sivanesan.M<sup>1</sup>, Sivasakthi.S<sup>2</sup>, Sivasakthi Balan.M<sup>3</sup>,  
Sriashokkumar. M<sup>4</sup>, KannanS<sup>5</sup>, Sangameswaran B<sup>6</sup>

\*Assistant professor, Department of Pharmacology, SSM College of Pharmacy,

<sup>1,2,3,4</sup>B.Pharm Final Year Research Scholars, SSM College of Pharmacy,

<sup>5</sup>Professor and Head, Department of Pharmacology, SSM College of Pharmacy,

<sup>6</sup>Principal, SSM College of Pharmacy,

Affiliated to The Tamilnadu Dr.M.G.R. Medical University

Date of Submission: 15-08-2025

Date of Acceptance: 25-08-2025

### ABSTRACT:

The present study is to evaluate the acute toxicity profile of *Crossandra infundibuliformis* plant extract in albino rats using OECD guidelines. *Crossandra infundibuliformis* ethanolic extract was administered orally by oral gavage in single dose of 2000mg/kg then observed for 14 days. The animals were observed for clinical observation, changes and carried out haematological studies. The body weight of animals was elevated steadily in vehicle treated groups and extract treated animals within the survey course, the body weights were normal during the 2 weeks of study, Behavioural monitoring of the extract treated animals demonstrated raised respiration rate and somatomotor activity for first hours. Subtle trembling was also detected in the extract treated rats in 1st day. Sometimes itching was noticed in extract treated groups in first days of this research, Other than the abovementioned changes, Administration of *Crossandra infundibuliformis* extract did not induce behavioural changes at any time point in treated rats compared to the control group, all the haematological values in all treated groups were remained within the physiological range after the experimental period. Based on these results, the ethanolic extract of *Crossandra infundibuliformis* did not cause any toxicological effect. This result provides basic toxicological profile.

**Key words:** Acute oral toxicity, Ethanolic extract, *Crossandra infundibuliformis*, Albino rats

### I. INTRODUCTION:

Herbal medicine is an alternative natural remedy in primary health care in developing countries. Medicinal plants are widely used for the treatment of a variety of diseases and assumed to

be safe World Health (WHO). Plants synthesize a variety of metabolites, some of which may be beneficial or potentially toxic to mankind. Also, it has been true that pharmaceutical drugs may be therapeutic at one dose and toxic at another. In order to ensure safety, there must be a study to show safety profiles of herbs claimed to be beneficial to humans and the animals before deciding to use them<sup>[2]</sup>. There is an increasing public demand for research on bridging knowledge gaps about safety of medicinal plant<sup>[1]</sup>. The traditional use of medicinal plants in health management lacks through toxicological evaluations, particularly concerning lethal doses.<sup>[3]</sup>

*Crossandra infundibuliformis* belongs to the Acanthaceae family. This plant has been proved that to have various medicinal properties. *Crossandra infundibuliformis* is a popular tropical flower known as "Firecracker" because the seed pods that are usually formed after flowering tend to explode under high humid conditions. It is a plant which is important in South Indian horticulture industry. This plant is found abundantly in tropical areas such as Southern India, Malaysia, and Srilanka.<sup>[6]</sup>

*Crossandra infundibuliformis* plant is very well known for its therapeutic benefits in Indian systems of medicine including Ayurveda and Siddha and in other forms of traditional medicine worldwide for the treatment of several ailments. It is observed that many traditional utilities of *Crossandra infundibuliformis* got their authentication when it is tested using different disease-based pharmacological models taking various extracts of roots, leaves, and stem as test samples.<sup>[9]</sup>

*Crossandra infundibuliformis* was found to have flavonoids, steroids, tannins, volatile oils,

alkaloids, glycosides, saponins, carbohydrates, proteins and amino acids which helps in reducing inflammation. There are various allopathic treatments available in inflammation, but they have one or the other limitation due to their side effects. Therapeutic agents like non-steroidal anti-inflammatory drugs (NSAIDs) cause gastrointestinal and cardiac toxic effect.<sup>[8]</sup> Leaf extracts of *Crossandra infundibuliformis* have aphrodisiac, anti-inflammatory and analgesic effect. The leaf extracts shown wound healing, antibacterial, antioxidant, antisolar, and larvicidal properties. This plant's therapeutic properties make it useful for treating a variety of diseases<sup>[14]</sup>.

The objective of present study is to evaluate acute toxicity profiles of *Crossandra infundibuliformis* in albinorats.<sup>[2]</sup>

#### THERAPEUTIC USES:

*Crossandra infundibuliformis* ethanolic extract was used for various therapeutic purpose, Antimicrobial activity - leaves of *Crossandra infundibuliformis*, Wound healing activity by *Crossandra infundibuliformis* floral extract shown remarkable wound healing potential, The hepatoprotective activity was shown by extract of dried leaf, Aphrodisiac Activity leaves revealed the presence of alkaloids and saponins, The ethanol extract of *Crossandra infundibuliformis* shown antibacterial activity against all six pathogenic micro organism, Anticancer activity-The ethanolic extract of the leaves of *Crossandra infundibuliformis* was studied, Methanol and chloroform extract of *Crossandra infundibuliformis* shows substantial antioxidant activity in the majority of method examined. The antioxidant activity of methanol and chloroform extract of *Crossandra infundibuliformis* was ideal when total phenol and flavonol levels were taken into account. The results of the investigation shows that methanol and chloroform extract of *Crossandra infundibuliformis* could serve as a source of natural antioxidant

## II. MATERIALS AND METHODS

#### Plant material:

The aerial parts of *Crossandra infundibuliformis* (L.) were collected from the local area of Komarapalayam in the month of May 2025, Namakkal District, Tamilnadu, India. The plant material was authenticated by Dr.P.RADHA; Research officer (Botany) Sci II, I/C; Siddha Medicinal Plants Garden /Mettur Dam, Tamilnadu-636401 .and a voucher specimen {C0205250021}

was submitted at the SSM College of Pharmacy, Erode(638312) Tamilnadu, India.

#### Extraction of plant:

The Ethanolic extract of *Crossandra infundibuliformis* (L.) was prepared by maceration. First, the aerial parts of plants (flowers, leaves, stem) was collected, washed, and dried at a temperature not exceeding 40°C. After drying, the material was ground into a coarse powder using a mechanical grinder. A known quantity(100gm) of the powder was placed in a clean glass container, and 500-800 ml ethanol was added to the plant material. The mixture was sealed and left to macerate at room temperature for 72 hours, with gentle shaking and stirred it for the every 24 hours to facilitate extraction. After 72 hours, the mixture was filtered by what man filter paper to separate the solid plant material from the liquid extract. The filtrate was collected, and the Ethanolic solvent was then evaporated. The final extract was stored in a clean container and in refrigerator below 20°C.

#### Acute toxicity studies using rat model:

Acute oral exposure in rats are observed and compared the results with the acute oral toxicity of *Crossandra infundibuliformis* extract. Our results demonstrate that although the *Crossandra infundibuliformis* ethanolic extract was non-toxic (LD<sub>50</sub>> 2000 mg/kg) (Rizwana Abid, Riaz Mahmood et al. 2019). Acute oral toxicity was carried out according to the methods described in the guidelines of the **Organization for Economic Co-operation and Development** (OECD) 423 (Test no. 423: acute oral toxicity-acute toxic class method, 2002). The animals received a constant volume of test materials oral route (Ghizlane Nouiour et al., 2023). For all the experiments, animals were fasted for 12hr (overnight) and allowed free access to water. The next day, they were randomly allocated into three groups and administered oral treatment. Prior to dose administration, the body weight of each animal was measured. Food was provided after one hour of dosing. All the animals were observed twice daily for the next 13 days, making a total of 14 days.

#### Calculation of doses:

*Crossandra infundibuliformis* extract 2000 mg/kg body weight for female albino rats DOSE= (Body weight ÷1000) x 2000. Then make up the volume with acacia solution [1:10 ratio of acacia and water] according to body weight of rat taken (1ml/100gm of body weight)(OECD 423)

### III. RESULT AND DISCUSSION:

#### Plant extraction:

The plant extract was done by maceration method using ethanol as solvent. Obtained plant extract was green viscous, semisolid in nature. The percentage yield value of the extract was 16.95%

#### 1. Clinical observation:

Effects of the vehicle and *Crossandra infundibuliformis* extract (2000 mg/kg) of body weight of rats in acute oral toxicity test.

**Table 1: Result of clinical observation**

Groups	1st day body weight (gm)	7th day body weight (gm)	14th day body weight (gm)
Vehicle control	180.22 ± 5	182.30 ± 5	182.92 ± 5
2000 mg/kg extract Group 1	166.33 ± 5	167.47 ± 5	167.72 ± 5
Group 2	208.5 ± 5	210.3 ± 7	209.7 ± 4
Group 3	205.3 ± 3	207.6 ± 2	204.90 ± 3

#### 2. Haematological studies:

Effect of administration of vehicle & *Crossandra infundibuliformis* extract on

haematological parameters in female albino rats in acute oral toxicity test.

**Table 2: Result of haematological studies.**

Parameters	Unit	Vehicle treated	Extract treated
RBC	10 <sup>6</sup> /μL	9.12	9.15
WBC	10 <sup>3</sup> /μL	11.76	12.11
Haemoglobin	g/dL	11.39	11.62

#### 3. Behavioural changes:

Behavioural patterns of rats in vehicle & *Crossandra infundibuliformis* extract (2000 mg/kg) treated groups following acute oral toxicity test.

Parameters	Day 1		Day 7		Day 14	
	C	E	C	E	C	E
Fur & skin	N	N	N	N	N	N
Eyes	N	N	N	N	N	N
Itching	N	P	N	N	N	N
salivation	N	N	N	N	N	N
Somatomotor activity	N	P	N	N	N	N

Urination (colour)	N	N	N	N	N	N
Sleep	N	N	N	N	N	N
Convulsions & Tremors	N	P	N	N	N	N
Respiration	N	P	N	N	N	N
Mortality	N F	NF	NF	NF	NF	NF

**Table 3: Result of behavioural observation**

Key: C =Vehicle Control group; = Crossandra infundibuliformis extract treated groups; N = Normal; P = Present; ↑ = Increase; N.F = Not found.

**Discussion:**

The body weight (BW) of animals was elevated steadily in vehicle treated groups and extract treated animals within the survey course, the body weights were normal during the 2 weeks of study. 2000 mg /kg did not result in any significant change in the mean body weight of extract-treated groups compared to the control. Crossandra extract was considered as safe in the observation of body weight.<sup>[21]</sup>

Behavioural monitoring of the extract treated animals demonstrated raised respiration rate and somtomotor activity for first hours. Subtle trembling was also detected in the extract treated rats in 1st day. Sometimes itching was noticed in extract treated groups in first days of this research. Other than the above mentioned changes, Administration of CIE did not induce behavioural changes at any time point in treated rats compared to the control group. No mortality was observed during the experimental period

Administration of extract did not cause any significant change in haematological parameters tested [i.e. red blood cells (RBC), white blood cells (WBC), haemoglobin,] at the dose of 2000mg/kg when compared to normal control observed for 14 days. In other words, all the haematological values in all treated groups were remained within the physiological range after the experimental period<sup>[21]</sup>

**IV. CONCLUSION:**

The findings of the present study demonstrated that ethanolic extracts of Crossandra infundibuliformis, did not cause mortality in experimental rats at dose 2000 mg/kg in acute toxicity tests. as supported by clinical signs, Behavioural changes and haematological findings. The information obtained from this study can serve as a baseline for further pharmacological studies of these medicinal plants. In conclusion, the oral

doses of Crossandra infundibuliformis extract can be considered safe as they did not exhibit any lethality nor adverse effects in the acute toxicity studies in female albino rats. The present study provides supportive data on the use of Crossandra infundibuliformis in traditional medicine and could lend credence for its medicinal use. Chronic toxicity, mutagenicity and carcinogenicity evaluations should be performed to have a better understanding of the plant’s safety profile.

**Acknowledgement :**None

**Conflict of interest :**None

**Financial support :**None

**Ethical statement :** This study was conducted in accordance with animal ethical committee. The approval for this study was obtained in SSM COLLEGE OF PHARMACY by animal ethics committee of an institution.

**REFERENCES:**

- [1]. Abid, R., & Mahmood, R. (2019). “Acute and sub-acute oral toxicity of ethanol extract of Cassia fistula fruit in male rats”, Avicenna Journal of Phytomedicine, vol. 9 No.2, 117–125.
- [2]. Alelign, T., Chalchisa, D., Fekadu, N., Solomon, D., Sisay, T., Debella, A., & Petros, B. (2020). “Evaluation of acute and sub-acute toxicity of selected traditional antiurolithiatic medicinal plant extracts in Wistar albino rats”, Journal of Ethnopharmacology, 262, 113192. <https://doi/10.1016/j.jep.2020.113192>
- [3]. Amoateng, E. O., Amateifio, P., Ossei, P. S., Fenteng, E. A., Amponsah, I. K., Ayibor, W. G., Adjei, S., & Narh-Bedu, T. (2024). “An acute and sub-acute toxicological assessment of Reissantia indica plant extract in male Sprague-

- Dawley rats”, 2024, <https://doi.org/10.1016/j.sciaf.2024.e02089>
- [4]. Benrahou, K.; Mrabti, H.N.; Assaggaf, H.M.; Mortada, S.; Salhi, N.; Rouas, L.; El Bacha, R.; Dami, A.; Masrar, A.; Alshahrani, M.M.; “Acute and Subacute Toxicity Studies of Erodium guttatum Extracts by Oral Administration in Rodents”, 2022, 14, 735. <https://doi.org/10.3390/toxins14110735>
- [5]. Chandrashekar, R., Rai, M., & Kalal, B. S. (2022). “Acute and chronic toxicity studies on ethanolic leaf extracts of Clerodendrum viscosum and Leucas indica in Swiss albino mice”, International Journal of Biochemistry and Molecular Biology, 13(4), 40–48. <http://www.ijbmb.org>
- [6]. Chavhan, P., Shahare, P. D., Sheikh, M. T., Kalambe, P. S., & Nakhate, Y. D. (2023). Crossandrafundibuliformis: A review study on ethnobotany, phytochemical investigation and pharmacology. International Journal of Creative Research Thoughts (IJCRT), 11(5), 2320–2882. <http://www.ijpr.com>
- [7]. Cusinato, D.A.C., Souza, A.M., Vasconcelos, F., Guimarães, L.F.L., Leite, F.P., Gregório, Z.M.O., Giglio, J.R. and Arantes, E.C., 2010. “Assessment of biochemical and hematological parameters in rats injected with Tityus Serrulatus scorpion venom”. Toxicon, 56(2), pp.147-153.
- [8]. Dhamija, I., Suhag, A., Kumar, S., & Chaudhary, H. (2015). Evaluation of anti-inflammatory activity of herbal methanolic floral extract of Crossandrafundibuliformis (Linn.) Nees. International Journal of Biology, Pharmacy and Allied Sciences (IJPBAS), 4(4), 2058–206. <https://www.ijbpas.com>
- [9]. Hari Vishva P, Abdul Azim A, Vanitha M, Ganesan S, Gokulnath K (2022) Pharmacognostical Studies and Pharmacological Activities of S. A.Saganuwan (2016). “Toxicity study of drugs and chemicals in animals” an overview., ISSN 1311-1477; DOI: 10.15547/bjvm.983
- [17]. Selvakumar, S. (2015). Preliminary phytochemical analysis of aerial parts of Crossandrafundibuliformis. Journal of Crossandrafundibuliformis . Int J Res Dev Pharm L Sci, 8: 140
- [10]. Nouioua, G., Tourabi, M., Tahraoui, A., El-yagoubi, K., Maache, S., Elfatemi, H., Lyoussi, B., & Derwich, E. H. (2023). “Assessment of the acute and subacute toxicity of the aqueous extract of Moroccan Ferula communis fruit in a mouse model”. Journal of Ethnopharmacology. Advance online publication. <https://doi.org/10.1016/j.jep.2023.117322>
- [11]. Ngozi, A. O., Edijana, O. C., Josephine, O. O., Silvanus, O. I., & Sophia, N. C. (2016). “Assessment of the hematological parameters of albino rats fed on high dose of whole wheat”. British Journal of Pharmaceutical Research, 10(1), 1–8. <https://doi.org/10.9734/bjpr/2016/2157>
- [12]. OECD. (2008). OECD Guideline for the Testing of Chemicals: Acute Oral Toxicity Up-and-Down-Procedure (UDP). OECD/OCDE 425
- [13]. Patil, K. G., Jaishree, V., & Tejaswi, H. N. P. (2014). Evaluation of phenolic content and antioxidant property of Crossandrafundibuliformis leaves extracts. American Journal of Plant Sciences, 5(12), Article ID 59126.
- [14]. Remya, S. B., Rakesh Kumar, J., Subash Chandran, M. P., & Aparna, P. (2022). A review on cultivation, propagation and harvesting of Crossandrafundibuliformis. International Journal of Research Publication and Reviews, 3(4), 971–978. Retrieved from <http://www.ijrpr.com>
- [15]. Sajeena, C. H., Kalliyath, M. D., P., M. N., Shabeeb, M., Mufeedha, K. P., Salih, K. T. M., Baboo, R. V. C., & Sirajudheen, M. K. (2024). A review on Crossandrafundibuliformis. World Journal of Pharmaceutical Research, 13(12), 547–559. <https://doi.org/10.20959/wjpr202412-32870>
- [18]. Sharmilla, N., & Gomathi, N. (2011). Antibacterial, antioxidant activity and phytochemical studies of Crossandrafundibuliformis leaf extracts. International Journal of Phytomedicine, 3, 151–



- 156.<http://www.ajournals.org/index.php/ijpm/index>
- [19]. Vadivel, E., &Panwal, S. V. (2016). In vitro anticancer and insecticidal activity of *Crossandrafundibuliformis*. *Journal of Chemical and Pharmaceutical Research*, 8(5), 260–264.<http://www.jocpr.com>
- [20]. Vasantha, G., Bhargavi, D., Yashodha, A., Roy, N. S., & Shaik, S. A. (n.d.). A plant review on *Crossandrafundibuliformis*. *Anvesak, UGC Care Group 1 Journal*. Department of Pharmacology, Vignan Institute of Pharmaceutical Technology, Duvvada, Visakhapatnam
- [21]. Zarei, M. H., Lorigooini, Z., Amini Khoeii, H., &Bijad, E. (2023). “Acute oral toxicity assessment of Galbanic acid in albino rat”, according to OECD 425 TG. *Toxicology Reports*, 10,1597–1603.<https://doi.org/10.1016/j.toxrep.2023.07>