Toxicity study on Clinacanthus nutans leaf hexane fraction using Danio rerio embryos

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Abstract

Clinacanthus nutans, an herbal shrub belonging to the Acanthaceae family, is traditionally used as a functional food to treat various ailments in Malaysia and Indonesia. Although the polar fraction of this plant shows nontoxic effect, the toxicity of the non-polar extract is not reported so far. The present study aimed to assess the toxic effect and determine the lethal concentration of this non-polar fraction using zebrafish embryos. The n-hexane fraction was partitioned from the crude extract of C. nutans obtained using 80% methanolic solution. After spawning of the adult male and female zebrafish, the eggs were collected, transferred into a 96-well plate and incubated with the n-hexane fraction at concentrations of 15.63 mu g/ml, 31.25 mu g/ml, 62.5 mu g/ml, 125 mu g/ml, 250 mu g/ml and 500 mu g/ml in 2% DMSO. The survival and sublethal endpoint were assessed, the mortality and hatchability rates were calculated based on microscopic observation, while the heartbeat rate was measured using DanioScope software. The median lethal concentration (LC50) of the C. nutans n-hexane fraction, which was determined using probit analysis, was calculated to be 75.49 mu g/mL, which is harmful. Moreover, gas chromatography-mass spectrometry (GC-MS) analysis revealed the presence of palmitic acid, phytol, hexadecanoic acid, 1-monopalmitin, stigmast-5-ene, pentadecanoic acid, heptadecanoic acid, 1-linolenoylglycerol and stigmasterol in the n-hexane fraction.

Keywords

Author Keywords: Clinacanthus nutans; Danio rerio; DanioScope; Median lethal concentration; Teratogenicity; Probit analysis

KeyWords Plus: METHANOL EXTRACT; ZEBRAFISH; MODELS; DISEASE; LEAVES; LARVAE

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Cited References: 33

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1. **Screening of selected Malaysian plants against several food borne pathogen bacteria** — Times Cited: 9
By: Abd Aziz, SM; Low, CN; Chai, LC; et al.
International Food Research Journal Volume: 18 Pages: 1195-1201 Published: 2011
[Show additional data]

2. **Clinacanthus nutans: A review of the medicinal uses** — Times Cited: 39
By: Alam, A.
pharmacology and phytochemistry Volume: 9 Pages: 402-409 Published: 2016

3. **Zebrafish Embryos and Larvae: A New Generation of Disease Models and Drug Screens** — Times Cited: 111
By: Ali, Shaukat; Champagne, Danielle L.; Spaink, Herman P.; et al.
BIRTH DEFECTS RESEARCH PART C-EMBRYO TODAY-REVIEWS Volume: 93 Issue: 2 Pages: 115-133 Published: JUN 2011

4. **ZEBRAFISH EMBRYO TOLERANCE TO ENVIRONMENTAL STRESS FACTORS-CONCENTRATION-DOSE RESPONSE ANALYSIS OF OXYGEN LIMITATION, PH, AND UV-LIGHT IRRADIATION** — Times Cited: 11
By: Andrade, Thayres S.; Henriques, Jorge F.; Almeida, Ana Rita; et al.
ENVIRONMENTAL TOXICOLOGY AND CHEMISTRY Volume: 36 Issue: 3 Pages: 682-690 Published: MAR 2017

5. **In Vitro Screening of Cytotoxic, Antimicrobial and Antioxidant Activities of Clinacanthus nutans (Acanthaceae) leaf extracts** — Times Cited: 33
By: Arullappan, Sangeetha; Rajamanickam, Prabu; Thevar, Naadeirmuthu; et al.
TROPICAL JOURNAL OF PHARMACEUTICAL RESEARCH Volume: 13 Issue: 9 Pages: 1455-1461 Published: SEP 2014

6. **Phytochemical evaluation of polyherbal formulation of Clinacanthus nutans and Elephantopus scaber to identify flavonoids** — Times Cited: 2
By: Aslam, M.S.; Mamat, A.S.; Ahmad, M.S.
Pharmacogn. J. Volume: 8 Pages: 534-541 Published: 2016

7. Title: [not available] — Times Cited: 1
By: Avdesh, A.; Chen, M.; Martin-iverson, M.T.; et al.
Regular Care and Maintenance of a Zebrafish (Danio rerio) Laboratory: An Introduction Published: 2012
[Show additional data]

8. **Towards an alternative for the acute fish LC50 test in chemical assessment: The fish embryo toxicity test goes multi-species - an update** — Times Cited: 216