

## Investigating anticancer potential of methanolic extract of *Cyperus rotundus* rhizome: *In vitro* analysis on Dalton's lymphoma cells and toxicity evaluation in mouse model

Abhinandan Choudhury, Namram Sushindrajit Singh & Akalesh Kumar Verma\*

Department of Zoology, Cotton University, Guwahati 781001, India

Received 29 December 2024; revised 14 July 2025

*Cyperus rotundus* Linn (CR), commonly known as nutgrass or purple nutsedge has long been valued in traditional medicine for its diverse pharmacological properties, including anti-inflammatory, antimicrobial, antioxidant and anticancer activities. The anticancer activity of CR methanolic extract was investigated using Dalton's lymphoma (DL) cells, while its toxicity profile was evaluated in normal mice to assess safety *in vivo*. The rhizomes were extracted using 70% methanol and subjected to phytochemical screening revealing a diverse range of bioactive compounds including carbohydrates, proteins, amino acids, lipids and other active substances. High performance thin layer chromatography (HPTLC) was further performed on the CR extract to obtain its phytochemical fingerprint. *In vitro* cytotoxicity assays demonstrated that a single dose (200 µg/mL) of CR extract induced significant time-dependent cytotoxicity in DL cells as evidenced by the Trypan Blue exclusion assay and eosin staining method. Morphological observations revealed apoptotic features such as membrane blebbing and vacuolarization confirming apoptosis induction. Histopathological analysis of heart, lungs, liver, spleen, kidneys, testes and ovary following a single high-dose (5000 mg/kg b.w.) administration of the extract revealed no significant histological alterations. The preserved tissue architecture across all examined organs suggests that the extract is well-tolerated and does not elicit overt toxicity at this dosage, supporting its preliminary safety profile. The findings demonstrate the potential of CR rhizome extract as a natural anticancer agent with minimal toxicity. Further investigations are required to elucidate the underlying molecular mechanisms and to confirm the therapeutic efficacy of the extract in clinical settings.

**Keywords:** Cancer, Antitumor, Phytochemicals, Traditional medicine, Histology