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Tithonia diversifolia (Hemsl.) A. Gray as a medicinal plant: a comprehensive review of its ethnopharmacology, phytochemistry, pharmacotoxicology and clinical relevance

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ABSTRACT

Ethnopharmacological relevance:

Tithonia diversifolia (TD) is widely valued in several cultures for its medicinal properties. A comprehensive review of the current understanding of this plant species is required due to emerging concerns over its efficacy, toxicity and allergenic potential.

Aim of the review:

We critically summarized the current evidence on the botany, traditional use, phytochemistry, pharmacology and safety of TD, with the view to provide perspectives for developing more attractive pharmaceuticals of plant origin, but also to lay a new foundation for further investigations on this plant.

Materials and methods:

A preliminary consultation of search engines such as Web of Science, PubMed, ScienceDirect and other published/unpublished resources provided an overview of extant literature on TD. Then, we meticulously screened all titles, abstracts and full-texts to establish consistency in the application of inclusion criteria. Studies were considered for inclusion if they dealt with taxonomy, global distribution, local and traditional knowledge, phytochemistry, toxicity and biological effects.

Results:

1,856 articles were retrieved among which 168 were revised and included. Several studies conducted on cell lines and animals provided supporting evidence for some ethnomedicinal claims of extracts from TD. Short-term use of *Tithonia* extracts were effective and well-tolerated in animals when taken at lower doses. Both the toxic and therapeutic effects were attributed to bioactive principles naturally occurring in this species including sesquiterpene lactones, chlorogenic acid and flavonoids.

Conclusions:

T. diversifolia is a valuable source of bioactive compounds with significant therapeutic implications and favourable safety index. However, more rigorously designed investigations are needed to recommend the whole plant or its active ingredients as a medication, and should focus on understanding the multi-target network pharmacology of the plant, clarifying the effective doses as well as identifying the potential interactions with prescribed drugs or other chemicals.

Abbreviations:

ABTS, 2,2′-Azinobis (3-ethylbenzothiazoline-6-sulphonate); Ach, acetyl choline; ALP, alkaline phosphatase; ALT, alanine aminotransferase; AMPK, 5' adenosine monophosphate-activated protein kinase; AST, Aspartate transaminase; CAs, chlorogenic acids; CC_{50}, half-maximal cytotoxic concentration; COX, cyclooxygenase; DM, dichloromethane; DPPH, 2,2-diphenyl-1- picrylhydrazyl; DRC, democratic republic of