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Pharmacological Evaluation of Curcumin for its Anti-inflammatory and Antioxidant Effects Using In-vitro and In-vivo Models in Rats

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Abstract

Curcumin, a polyphenolic compound derived from *Curcuma longa* (turmeric), has been extensively reported for its diverse pharmacological activities, particularly anti-inflammatory and antioxidant effects. The present study was designed to evaluate the pharmacological potential of curcumin using both in-vitro and in-vivo experimental models in rats. In-vitro antioxidant activity was assessed through standard free radical scavenging assays, including DPPH and nitric oxide methods, while anti-inflammatory potential was determined via protein denaturation inhibition and membrane stabilization techniques. For in-vivo evaluation, acute inflammation was induced in Wistar rats using carrageenan-induced paw edema, and chronic inflammation was assessed by cotton pellet-induced granuloma models. Curcumin was administered orally at varying doses, and its efficacy was compared with standard anti-inflammatory and antioxidant agents. Results demonstrated that curcumin significantly ($p < 0.05$) reduced paw edema volume and granuloma formation in a dose-dependent manner. In-vitro assays revealed potent free radical scavenging activity, indicating strong antioxidant potential. The observed pharmacological effects may be attributed to curcumin's ability to modulate inflammatory mediators, inhibit lipid peroxidation, and enhance endogenous antioxidant defense systems. These findings suggest that curcumin possesses considerable therapeutic potential as a natural anti-inflammatory and antioxidant agent. Further studies focusing on its bioavailability enhancement and clinical translation are warranted to develop it into an effective pharmacotherapeutic candidate.

Keywords: Curcumin, anti-inflammatory, antioxidant, in-vitro, in-vivo, rats

Biography:

Nakka Rajeswari is working as a Assistant professor in the department of Pharmacology. She guide M.Pharmacy students & also a member of animal ethical committee at Sri Venkateswara college of pharmacy, Etcherla, Srikakulam. Her research interests primarily focus on natural products pharmacology, with a particular emphasis on the evaluation of phytochemicals for their therapeutic potential. She has a keep interest in studying bioactive compounds such as curcumin for their anti inflammatory, anti oxidant and disease modifying properties. Her work integrates both in-vitro and in-vivo experimental approaches to assess pharmacological efficacy and underlying mechanism of action. In addition to her academic research, she is passionate about exploring strategies to improve the bioavailability and applicability of herbal compounds.

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