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Effect of piperine on inhibition of FFA induced TLR4 mediated inflammation and amelioration of acetic acid induced ulcerative colitis in mice

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Ethno Pharmacological Relevance: Piperine, a main component of *Piper longum* Linn and *Piper nigrum* Linn, is a plant alkaloid with a long history of medicinal use. Piperine exhibits antidepressant, hepato-protective, anti-metastatic, anti-thyroid, immuno-modulatory, antitumor and anti-inflammatory activities; however its therapeutic potential in amelioration of ulcerative colitis and the underlying mechanism for anti-inflammatory activity remains unknown.

Aim: The objective of the present investigation was to unravel the therapeutic potential of piperine on amelioration of IBD using acetic acid induced experimental animal model for ulcerative colitis and to determine the role of TLR4 receptor in signaling pathway of inflammatory gene expression in ulcerative colitis.

Materials & Methods: We induced colitis using acetic acid (150 µl of 5% once, intrarectally) in mice and estimated Disease Activity Index (DAI), which took into account weight loss, stool consistency, occult/gross bleeding. Colon length, spleen weights, ulcer area and ulcer index were measured, histological changes were observed by H&E staining. Effect of piperine on various antioxidant parameter of mice colon such as tissue Myeloperoxidase (MPO) accumulation, SOD concentrations, reduced GSH and lipid peroxidation were determined. Pro-inflammatory mediators, namely, Nitric Oxide (NO), Tumor Necrosis Factor-α (TNF-α) were determined by TNF-α ELISA kit obtained from Thermo Fisher Scientific India Pvt. Ltd. Effect of piperine on hematological parameters of mice in acetic acid induced IBD was also determined which involves the estimation of FFA using commercial free fatty acid fluorometric assay kit.

Result: Piperine significantly attenuated acetic acid induced DAI score which implies that it suppresses weight loss, diarrhea, gross bleeding and infiltration of immune cells. Piperine administration also effectively and dose dependently prevented shortening of colon length and enlargement of spleen size. Histological examination indicated that piperine reduces edema in sub mucosa, cellular infiltration, reduced hemorrhages and ulceration as compare to acetic acid induced colitis in mice. Furthermore, piperine inhibited abnormal secretion of pro-inflammatory mediators namely NO, cytokines TNF-α, and reduces FFA induced TLR4 mediated inflammation.

Conclusion: These results suggest that piperine has an anti-inflammatory effect at colorectal sites that is due to down-regulations of the productions and expression of inflammatory mediators and it also reduces FFA induced TLR4 mediated inflammation. Thus, it may have therapeutic potential on amelioration of IBD.

Biography

Rohit A Gupta has completed his MPharm from Rashtrasanth Tukdoji Maharaj Nagpur University Nagpur from Institute of Pharmaceutical Education and Research, Wardha. He is working as an Assistant Professor at Dadasaheb Balpande College of Pharmacy, Nagpur and had recently registered for his PhD at UDPS, Nagpur. He has published 2 books, 3 international papers and attended several national/international conferences. He is also serving as Director for Pharma Tutorials Pvt. Ltd, Nagpur; a premier institute providing education for various entrance exams in pharmaceutical science.

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