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LETTER TO THE EDITOR

Use of curcumin and its nanopreparations in the treatment of inflammatory bowel disease

Zi-Wen Meng, Bing Chang, Li-Xuan Sang

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Abstract

Inflammatory bowel disease (IBD) is a nonspecific inflammatory disease of the intestine that includes Crohn's disease and ulcerative colitis. Because IBD is difficult to heal and easily relapses, it could worsen patient quality of life and increase economic burdens. Curcumin (CUR) is a bioactive component derived from the rhizome of turmeric (Curcuma longa). Many basic and clinical studies have shown that CUR can efficiently treat IBD by decreasing the activity of proinflammatory cytokines by communicating with transcription factors and signaling molecules. However, due to the limitations of being almost insoluble in aqueous solutions and having low oral bioavailability, it is important to select appropriate pharmaceutical preparations.

Key Words: Curcumin; Inflammatory bowel disease; Bioavailability; Nanotherapeutics;

Core Tip: Curcumin (CUR) can efficiently decrease the activity of proinflammatory cytokines by communicating with transcription factors and signaling molecules. It is a new area of research that may be promising in the future to treat patients with inflammatory bowel disease, especially in patients with ulcerative colitis. How to improve the bioavailability of CUR *in vivo* was also discussed.

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TO THE EDITOR

With great interest, we have read the article by Zheng *et al*[1], who found that curcumin (CUR) regulated mTh/mTfh cell homeostasis by inhibiting the c-Jun amino-terminal kinases (JAK) 1/STAT3/SOCS signaling pathway, thus alleviating dextran sulfate sodium (DSS) induced pathological injury in the colon. Various studies have shown that CUR can also efficiently decrease the activity of proinflammatory cytokines by communicating with other transcription factors and signaling molecules. For example, CUR inhibits the activation of transcription factors, multiple protein kinases, and antiapoptotic proteins and modulates various inflammatory cytokines by suppressing the inflammatory transcription factor nuclear factor-κB[2]. Khan *et al*[3] reported the inhibitory effects of CUR on JNKs, extracellular-signal-regulated kinases, and stress-activated protein kinases. These inhibitory effects involve decreasing the expression and release of proinflammatory mediators, such as tumor necrosis factor (TNF)-α and adhesion molecules. Current research indicates that CUR has high medicinal value, including anti-inflammatory, antioxidant, antitumor, antiapoptotic, antifibrotic, immunoregulatory and other effects, and can be used to treat a variety of diseases[4].

Although CUR has few adverse effects and is highly safe for use, it still has several disadvantages. CUR is hardly soluble in water solution due to its lipophilic properties and low bioavailability after oral administration[5]. Therefore, it is particularly important to choose a combination of CUR and other treatments or a modified CUR formula to treat ulcerative colitis (UC). First, Xu *et al*'s evaluation of the in vivo therapeutic effects on DSS-induced UC in mice revealed that dexamethasone (DEX)-loaded hydroxyethyl starch-CUR nanoparticles could enhance the efficacy of free DEX and significantly alleviate the lesions caused by UC[6]. Second, A nanocarrier of CUR coated with tannic acid and genipin crosslinked human serum albumin was prepared into CUR nanoparticles by Luo *et al*[7]. The synthetic nanoparticles prolonged the colonic adhesion of CUR and improved its absorption in Caco-2 cells. In addition, a study demonstrated that oral administration of turmeric-derived nanoparticles containing a specific preparation could ameliorate colitis in mice and accelerate colitis resolution by regulating the expression of proinflammatory cytokines, including TNF-α, interleukin (IL)-6, and IL-1β, and the antioxidant gene *HO-1*[8].

Notably, CUR nanomaterials have been tested not only in preclinical animal models but also in human clinical trials for the treatment of various diseases[9]. Further clinical studies on the possible benefits and associated risks of CUR nano preparations in patients with IBD are also warranted in the future[10].

FOOTNOTES

Author contributions: Meng ZW wrote the letter; Chang B and Sang LX supervised the manuscript draft; all authors contributed important intellectual content during drafting and revising of the manuscript.

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