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The effect of methylsulfonylmethane on the experimental colitis in the rat

K. Amirshahrokhi ^{a,*}, S. Bohlooli ^a, M.M. Chinifroush ^b^a Department of Pharmacology, School of Medicine, Ardabil University of Medical Sciences, P.O. Box 56197, Ardabil, Iran^b Department of Pathology, School of Medicine, Ardabil University of Medical Sciences, Ardabil, Iran

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ABSTRACT

Methylsulfonylmethane (MSM), naturally occurring in green plants, fruits and vegetables, has been shown to exert anti-inflammatory and antioxidant effects. MSM is an organosulfur compound and a normal oxidative metabolite of dimethyl sulfoxide. This study was carried out to investigate the effect of MSM in a rat model of experimental colitis. Colitis was induced by intracolonic instillation of 1 ml of 5% of acetic acid. Rats were treated with MSM (400 mg/kg/day, orally) for 4 days. Animals were euthanized and distal colon evaluated histologically and biochemically. Tissue samples were used to measurement of malondialdehyde (MDA), myeloperoxidase (MPO), catalase (CAT), glutathione (GSH) and proinflammatory cytokine (TNF- α and IL-1 β) levels. Results showed that MSM decreased macroscopic and microscopic colonic damage scores caused by administration of acetic acid. MSM treatment also significantly reduced colonic levels of MDA, MPO and IL-1 β , while increased the levels of GSH and CAT compared with acetic acid-induced colitis group. It seems that MSM as a natural product may have a protective effect in an experimental ulcerative colitis.

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Introduction

Inflammatory bowel disease (IBD), including ulcerative colitis (UC) and Crohn's disease (CD), is a chronic gastrointestinal disorder characterized by intestinal inflammation and mucosal tissue damage. IBD is a multifactorial disease of unknown etiology. However, it is believed that the pathophysiology of IBD involves an interaction among environmental, genetic and immunological factors. Chronic intestinal inflammation may result from activation of the immune system by normal intestinal bacteria. The activation of immune system results in the production of proinflammatory cytokines (TNF- α and IL-1 β), reactive oxygen metabolites, prostaglandins and leukotrienes (Krimsky et al., 2003). These mediators have been suggested to contribute to the development of mucosal damage of the colon and lead to a chronic inflammatory process.

To study the etiology of IBD, multiple mouse models of colitis have been developed and used to test new pharmacological agents for IBD. Acetic acid-induced colitis is a chemically induced model of colitis that exhibits various pathophysiological features of the human ulcerative colitis (Jurjus et al., 2004; Kawada et al., 2007). There have been several experimental studies on prevention or treatment of IBD by anti-inflammatory and antioxidative drugs (Mabley et al., 2003; Bitiren et al., 2010; Sengul et al., 2010).

MSM occurs naturally in small amounts in some green plants, fruits and vegetables. MSM as a dietary supplement has commonly been used (often in combination with glucosamine and chondroitin) to treat or prevent osteoarthritis (Gregory et al., 2008). Previous clinical studies have documented that MSM may have beneficial effects on some diseases, such as interstitial cystitis, parasites, constipation, musculoskeletal pain and allergies (Childs, 1994; Parcell, 2002; Maranon et al., 2008). A variety of toxicity studies have shown that MSM is essentially nontoxic to humans (Parcell, 2002). It has also been reported that MSM may be important as a nontoxic and effective chemotherapeutic agent to treat metastatic melanoma and possibly other metastatic cancers (Caron et al., 2010). MSM may act through its ability to scavenge oxidative radicals which trigger inflammation (Maranon et al., 2008). We hypothesized that MSM, due to its anti-inflammatory and antioxidant activity, may affect inflammatory diseases, such as colitis.

Materials and methods

Animals. Adult male Wistar rats, weighing 220–250 g, were housed in a room with a 12-h light/dark cycle. Rats had free access to tap water and ad libitum. Before the induction of colitis, rats were fasted overnight. All the chemicals were purchased from Sigma.

Induction of colitis. Rats were slightly anesthetized with ether and a rubber catheter was inserted into the rectum such that the tip was 8 cm inside the anus. Colitis was induced by intracolonic application of 1 ml of 5% acetic acid (in 0.9% NaCl). On the fourth day after the induction of colitis, rats were euthanized and the distal 8 cm of the colon was resected for evaluation of various parameters. After macroscopic examination, the

* Corresponding author. Fax: +98 451 5510057.

E-mail addresses: k.amirshahrokhi@arums.ac.ir, amirshahrokhi@gmail.com (K. Amirshahrokhi).