

# A Review of Glycosides as Possible Medicinal Ingredients for Ulcerative Colitis

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## Introduction

Ulcerative Colitis (UC) is a chronic inflammatory bowel disease characterized by inflammation of the colon and rectum. Current treatments for UC often have limitations in terms of efficacy and adverse effects. Therefore, there is a need for alternative therapeutic options. Glycosides, a diverse group of naturally occurring compounds found in plants, have shown promising therapeutic potential for UC due to their anti-inflammatory, antioxidant, and immunomodulatory properties. This review explores the role of glycosides as potential medicinal ingredients for the management of UC, focusing on their mechanisms of action, preclinical and clinical evidence, and future prospects. Ulcerative Colitis (UC) is a type of Inflammatory Bowel Disease (IBD) characterized by chronic inflammation and ulceration of the colon and rectum. The exact etiology of UC remains unclear, but it is believed to involve a complex interplay of genetic, environmental, and immune factors. Current treatments for UC primarily aim to induce and maintain remission, alleviate symptoms, and prevent complications. However, these treatments often have limitations such as partial efficacy, frequent relapses, and adverse effects including immunosuppression and increased risk of infections. Therefore, there is growing interest in exploring alternative therapeutic options for UC, including natural products derived from plants [1].

## Description

Glycosides are a diverse group of naturally occurring compounds found in a wide range of plants. They consist of a sugar moiety (glycone) covalently bonded to a non-sugar moiety (aglycone or genin) through a glycosidic linkage. Glycosides possess various pharmacological properties, including anti-inflammatory, antioxidant, antimicrobial, and immunomodulatory activities. Several glycosides have been investigated for their potential therapeutic effects in UC due to their ability to target key pathways involved in the pathogenesis of the disease. The pathogenesis of UC involves a complex interplay of genetic, environmental, microbial, and immune factors, leading to dysregulated immune responses, mucosal inflammation, oxidative stress, and tissue damage. Glycosides such as flavonoid glycosides, triterpene glycosides, and iridoid glycosides exhibit potent anti-inflammatory properties by inhibiting pro-inflammatory mediators such as cytokines (e.g., tumor necrosis factor- $\alpha$  TNF-, interleukins ILs), nuclear factor-kappa B (NF- $\kappa$ B) signaling pathway, and cyclooxygenase-2 (COX-2) expression [2].

Oxidative stress plays a crucial role in the pathogenesis of UC by inducing lipid peroxidation, DNA damage, and protein oxidation. Glycosides with antioxidant properties, such as anthraquinone glycosides and phenolic

glycosides, scavenge Reactive Oxygen Species (ROS), enhance endogenous antioxidant defense systems, and protect against oxidative damage. Dysregulated immune responses, including T cell activation, cytokine production, and immune cell infiltration, contribute to mucosal inflammation in UC. Glycosides modulate immune function by regulating T cell differentiation, inhibiting antigen-presenting cell activation, and promoting regulatory T cell (Treg) expansion, thereby attenuating inflammatory responses. Glycosides such as saponin glycosides and mucilage glycosides exert mucosal protective effects by enhancing mucin production, maintaining intestinal barrier integrity, and promoting mucosal healing, which are essential for the resolution of mucosal inflammation and ulceration in UC [3].

Numerous preclinical studies have investigated the therapeutic potential of glycosides in experimental models of UC, including Dextran Sulfate Sodium (DSS)-induced colitis and trinitrobenzene sulfonic acid (TNBS)-induced colitis in rodents. These studies have demonstrated that administration of various glycosides, either as purified compounds or plant extracts, attenuates colonic inflammation, reduces histological damage, improves clinical symptoms, and enhances colonic healing in UC models. The beneficial effects of glycosides in preclinical studies are attributed to their anti-inflammatory, antioxidant, immunomodulatory, and mucosal protective properties. Although limited clinical data are available, some clinical studies have evaluated the efficacy and safety of glycosides in patients with UC. For example, clinical trials investigating the use of herbal formulations containing glycosides, such as *Boswellia serrata* extract (containing boswellic acid glycosides) and *Aloe vera* extract (containing anthraquinone glycosides), have reported beneficial effects in reducing disease activity, improving clinical symptoms, and achieving mucosal healing in patients with UC. However, larger, well-designed clinical trials are needed to further evaluate the therapeutic potential of glycosides in UC and establish their safety profile [4].

Glycosides represent a promising class of natural compounds for the management of UC due to their multifaceted pharmacological properties and favorable safety profile. Standardization of plant extracts and purification of individual glycosides are essential to ensure consistency and reproducibility of therapeutic effects in clinical settings. Improving the bioavailability of glycosides, which are often poorly absorbed and metabolized in the gastrointestinal tract, is critical for enhancing their therapeutic efficacy. Although glycosides are generally considered safe, further studies are needed to evaluate their long-term safety profile, potential drug interactions, and adverse effects, especially at higher doses or prolonged use. More well-designed clinical trials are warranted to establish the efficacy, optimal dosing, and long-term benefits of glycosides as therapeutic agents for UC in human subjects [5].

## Conclusion

Glycosides are a diverse group of natural compounds with promising therapeutic potential for the management of ulcerative colitis. Through their anti-inflammatory, antioxidant, immunomodulatory, and mucosal protective properties, glycosides offer novel approaches for the treatment of UC by targeting key pathways involved in the pathogenesis of the disease. Although preclinical and limited clinical evidence supports the efficacy of glycosides in UC, further research is needed to elucidate their mechanisms of action, optimize formulations, and evaluate their long-term safety and efficacy in larger clinical trials. With continued scientific investigation and clinical validation, glycosides may emerge as valuable medicinal ingredients for the treatment of ulcerative colitis, offering new hope for patients with this debilitating condition.

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## Conflict of Interest

None.

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