

## Trehalose-Based Nanocarriers for Alleviation of Inflammation in Colitis

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**Abstract :** Non-steroidal anti-inflammatory drugs (NSAIDs) are considered a double edged sword in inflammatory bowel diseases (IBDs). Some studies reported their advantageous effect in decreasing inflammation, and other studies reported that their use is associated with colitis aggravation. This study aimed to use specifically formulated trehalose-based nano-carriers that targets the colon in an attempt to alleviate inflammation caused by NSAIDs. L- $\alpha$ -phosphatidylcholine (PL), trehalose, and transcutool were used to prepare the trehalosomes (THs), which were also loaded with Tenoxicam(TXM) as a model NSAID. To optimize the formulation variables, a full 23 factorial design, using Design-Expert® software, was performed. The optimized formulation composed of trehalose: PL at a weight ratio of 1:1, 377.72 mg transcutool, and sonicated for 4 min, possessed a spherical shape with a size of 268.61 nm and EE% of 97.83% and released 70.22% of its drug content over 24 h. The superior protective action of TXM loaded THs compared to TXM suspension and drug-free THs was shown by the inhibition of the inflammatory biomarkers, namely; IL-1 $\beta$ , IL-6, and TNF-alpha levels, as well as oxidative stress markers, measured as GSH and MDA. Improved histopathology of the colonic tissue in male New Zealand rabbits also confirmed the superiority of the TXM loaded THs compared to the unformulated drug or the drug free nano-carriers. Our findings highlight the prosperous role of THs in colon targeting and its anti-inflammatory characteristics in guarding against possible NSAIDs-driven exacerbation of colitis.

**Keywords :** inflammatory bowel disease, trehalose, trehalosomes, colon targeting

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