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Nerolidol, a sesquiterpene, attenuates oxidative stress and inflammation in acetic acid-induced colitis in rats

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Abstract

Targeting oxidative stress and inflammation by novel dietary compounds of natural origin convincingly appears to be one of the most important therapeutic strategies to keep inflammatory bowel diseases (IBD) such as ulcerative colitis disease in remission. It is imperative to investigate naturally occuring plant-derived dietary phytochemicals that are receiving attention for their therapeutic benefits to overcome the debilitating conditions of IBD. In the present study, the effect of nerolidol (NRD), a monocyclic sesquiterpene found in German Chamomile tea, was investigated in acetic acid-induced colitis model in Wistar rats. NRD was orally administered at a dose of 50 mg/kg/day either for 3 days before or 30 min after induction of IBD for 7 days, after intrarectal administration of acetic acid. The body weight, macroscopic, and microscopic analyses of the colon in different experimental

groups were observed on days 0, 2, 4, and 7. Acetic acid caused significant reduction in body weight and induced macroscopic and microscopic ulcer along with a significant decline of antioxidants, concomitant to increased malondialdehyde (MDA), a marker of lipid peroxidation, and myeloperoxidase (MPO) activity, a marker of neutrophil activation. Treatment with NRD significantly improved IBD-induced reduction in body weight, improved histology, inhibited MDA formation, and restored antioxidants along with reduced MPO activity. Acetic acid also induced the release of pro-inflammatory cytokines and increased calprotectin, released by neutrophils under inflammatory conditions. NRD treatment significantly reduced calprotectin and pro-inflammatory cytokines. NRD treatment showed potential to improve disease activity and inhibit oxidative stress, lipid peroxidation, and inflammation along with histological preservation of the colon tissues.

Data availability

The manuscript data are well archived with the principal investigator, Prof. Salim MA Bastaki. The manuscript data will be available to the editors upon reasonable request from Prof. Salim Bastaki.

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Contributions

SMAB and SO have conceptualized the study.
SMAB designed the experiments, and interpreted the data. NA has performed test treatments, animal care, experiments, and biochemical estimations. NA carried out the statistical analysis of all the data collected and archived all the data. EA performed the histopathological studies and interpreted the observations. SMBA and SO wrote the first draft of manuscript and SMBA significantly edited the manuscript. SO and SMBA have revised and submitted the final manuscript. All authors read and approved the final manuscript.

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Ethics declarations

Competing interest

The authors are grateful for the financial support from the United Arab Emirates University and for providing facilities to conduct the experiments. The authors declare that they have no competing interests.

Additional information

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