

Fucoidan extracts from *Undaria pinnatifida* (UPF) and *Fucus vesiculosus* (FVF) mitigate DSS-induced acute colitis in Mice: A Preclinical Investigation

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The escalating global prevalence of inflammatory bowel diseases (IBDs), comprising ulcerative colitis and Crohn's disease, poses a considerable burden on public health. Despite therapeutic advances, persistent inflammation and associated complications underscore the limitations of current medical approaches. Fucoidans, fucose-rich sulfated polysaccharides found in edible brown algae, exhibit promising anti-inflammatory properties. However, variations in bioactivities and efficacy among fucoidans from distinct seaweeds warrant comprehensive investigation.

Methods: This study systematically assessed the therapeutic potential of fucoidan extracts from *Undaria pinnatifida* (UPF) and *Fucus vesiculosus* (FVF) in a murine model of Dextran Sulfate Sodium (DSS)-induced acute colitis. Daily monitoring of colitis severity, coupled with macroscopic evaluation of collected colons and spleens, provided a comprehensive understanding. Histological scrutiny, utilising Hematoxylin and Eosin (H&E staining), and quantification of cytokines via enzyme-linked immunosorbent assay (ELISA) were integral components of our rigorous methodology.

Results: Oral administration of UPF and FVF over seven days significantly mitigated body weight loss, improved the Disease Activity Index (DAI), and reduced colon and spleen weight compared to their DSS-treated counterparts. DSS-induced mice exhibited notable histological abnormalities, including loss of crypt architecture, goblet cells, immune cell infiltration, and edema, all of which were effectively reversed by UPF and FVF supplementation. Importantly, the macroscopic improvements correlated with a substantial reduction in the production of 18 pro-inflammatory cytokines in distal colon (DC) tissues. The findings propose the potential of orally administered UPF and FVF as a nutraceutical alternative for IBD treatment.

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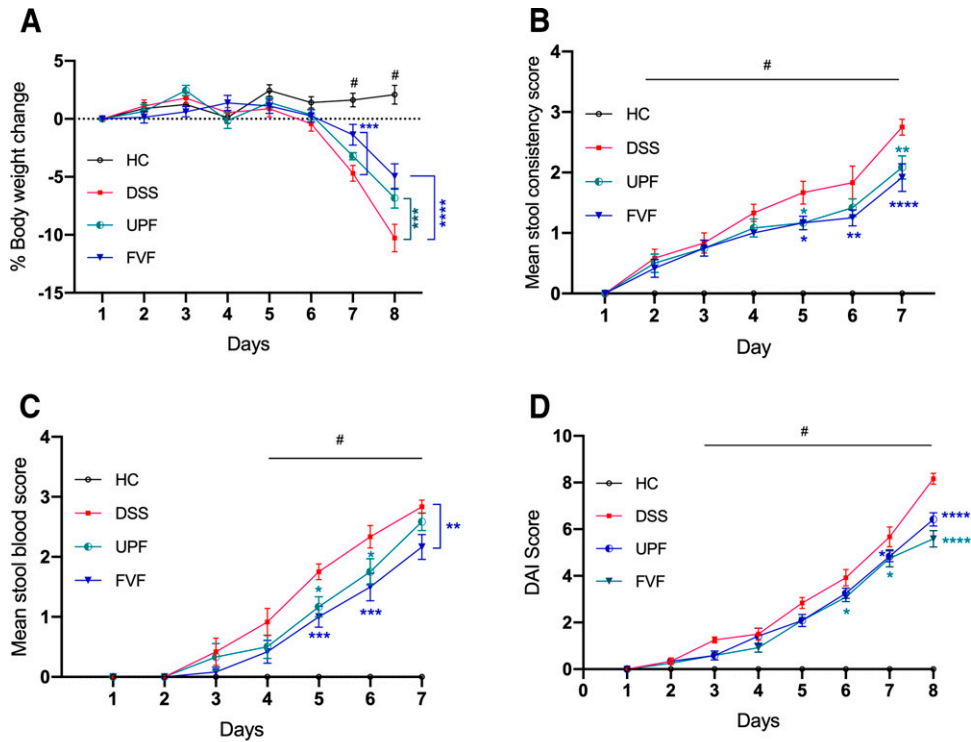


Figure 1. Effect of UPF and FVF on the pathology of acute colitis. (A) % body weight change in C57BL/6 mice between the groups receiving fucoidan treatment and without fucoidan treatment. Change in the body weight was calculated by dividing the body weight each day by the initial body weight before the start of the DSS treatment. (B) Stool samples were scored daily for stool consistency. (C) Stool samples were checked daily for occult blood. (D) Disease activity index (DAI) is a combined score of daily body weight change, stool consistency score, and occult blood score. Data are represented as the percentage or mean \pm SEM (n = 12/group). Two-way ANOVA followed by Tukey's post-test was used to calculate the statistically significant values. # Significant effect HC vs DSS; *Significant effect treatment vs DSS (DSS vs UPF) or (DSS vs FVF). A p-value of <0.05 was considered significant. *p < 0.05, **p < 0.001, ***p < 0.0001 and ****p < 0.00001. Healthy control (HC), DSS treated (DSS), *Undaria Pinnatifida* fucoidan treated (UPF), and *Fucus vesiculosus* fucoidan treated (FVF).