

The beneficial role of the probiotic *Bacillus clausii* on induced Murine Colitis: a clinical and pathological study

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Abstract

This study was performed to investigate inflammatory bowel disease (IBD), especially ulcerative colitis in a murine model by using TNBS-induced colitis; therefore it was performed on 60 animals divided equally into five groups, the first group was the control which received standard food and water only, the second group was probiotic which used 100 µl of *Bacillus clausii*, the third group disease group by TNBS induced colitis, the fourth group probiotic with TNBS induce colitis orally, the fifth group probiotic with TNBS induce colitis intra-rectal; the results showed loss of body weight and increased in body temperature in disease group TNBS compared to control groups during the duration of the research, the macroscopical features showed the shortness of colon in length, as well as swollen and congestion of colon in the disease induced group compared to other control and probiotic groups; the micropathological results of colon showed sloughing of mucosal layer, sever hyperplastic goblet cells of the mucosal layer of the colon by PAS stain in the disease induced group compared to other control and probiotic groups. the current study concluded that whether *Bacillus clausii* can prevent TNBS-induced colitis which is associated with microbial dysbiosis and sought to understand its origins; as a consequence, probiotic treatment reduced colonic inflammation and By increasing a group of gram-positive bacteria, researchers reduced the microbial dysbiosis that TNBS Induce-colitis causes.

Keywords: colitis, probiotic, TNBS, *Bacillus clausii*.

Introduction

Chronic inflammation illness with an unknown cause, inflammatory bowel disease. There are two primary clinical forms of IBD that are recognized: Crohn's disease (CD) and ulcerative colitis (UC) (Eichele and Young.,2019). While CD affects any portion of the gastrointestinal system intermittently, UC restricts inflammation to the colon and rectum (Ray and Sagar.,2020). Both kinds are chronic, inflammatory diseases that grow over time and frequently have remissions and relapses (Flynn and Eisenstein.,2019). Uncertainty surrounds the pathophysiology of UC and CD, however intricate connections between genetic, environmental, immunological, and gut microbial variables have been proposed. They coordinate a series of inflammatory reactions in the gut mucosa through their interactions (Kuhnen.,2019). It has been proven that immune cells release active substances linked to the start and maintenance of inflammation and the destruction of gastrointestinal tissue. Additionally, it has been discovered that IBD patients' colonic mucosa has an excessive infiltration of immune cells (Zhang and Li.,2014).

The etiology of UC and CD has also been linked to aberrant regulation of numerous cytokines. The cytokines interleukin (IL)-17A and IL-23 are among

them (Lopez et al.,2015). Mucosal edema and hemorrhagic ulcerations were found during the colon and rectum were examined under a microscope up to 24 hours following the TNBS therapy. The mucosa and submucosa's histologic examination in the first week revealed a significant infiltration of inflammatory cells. Neutrophils, and lymphocytes penetrated the mucosa, submucosa, and muscle layers (Buonocore et al.,2010). The probiotic bacteria *Bacillus clausii* is spore-forming, rod-shaped, aerobic, Gram positive, acid-resistant, and capable of colonizing the gut (Ghelardi et al.,2015). A combination of four *Bacillus clausii* probiotic strains (O/C, T, SIN, and N/R) may be useful in treating inflammatory bowel disease, according to data (Ianiro et al .,2018).

Material and methods

The female mice used in this study were aged between 8 and 10 weeks were used for study, all mice were housed at the University of Basrah, veterinary medicine animal facilities, residing in a designated pathogen-free environment with 12-hour light/dark cycles, all mice were housed in rooms with controlled temperature, ventilation.

A total of 60 female mice (Balb\c) which treated for 7 days as the following: To induce colitis 1 mg of (TNBS) injected into 90% ethanol will be