Ulcerative colitis is a chronic inflammatory bowel disease that results in diffuse friability and superficial erosions of the colonic wall and associated bleeding. Characteristically, the inflammation is restricted to the mucosa and submucosa of the colon. The specific cause is unknown, but autoimmunity is considered to have an important role in its etiology. In addition, the pathogenesis of this inflammatory bowel disease is believed to correlate with gut microbiome changes. Therefore, nutritional patterns are important in ulcerative colitis treatment. In this study, the Canadian researchers compared the effects of the Mediterranean diet and the Canadian habitual diet on the gut microbiome and ulcerative colitis activity in patients in remission of ulcerative colitis.

Previous studies have demonstrated a lack of diversity and general instability of the gut microbiome in ulcerative colitis, frequently accompanied by a dysbiosis characterized by the relative depletion of *Faecalbacterium praustnitzii* and *Roseburia hominis* and the enrichment of *Escherichia coli*, *Ruminococcus torques*, and *R.gnavus*.

The Mediterranean diet is characterized by increased consumption of legumes, whole grains, vegetables, fruits, nuts, seeds, and olive oil, moderate consumption of fish, poultry, and dairy foods, and low consumption of processed foods and red meat. High levels of dietary fiber, phytochemicals, and fat blend (high monounsaturated fat) have beneficial anti-inflammatory and antioxidant properties.



About the study

This prospective, randomized, controlled study enrolled 28 adults who were in remission of mild to moderate ulcerative colitis. They were on a stable dose of ulcerative colitis therapy without any dosage adjustments for two months before starting the study for those who were taking oral 5-aminosalicylates, thiopurines, or methotrexate, or for three months before starting the study for those who were taking infliximab or adalimumab. The median age of the participants was 47 years (ranging 18-65 years)

Participants were randomly assigned to either a Mediterranean diet (n = 15) or a Canadian habitual diet (n = 13) for 12 weeks. The Simple Clinical Colitis Activity Index (SCCAI) and

the Partial Mayo Score were used to assess disease activity at baseline and after 12 weeks. Fecal calprotectin, which directly measures intestinal inflammation and is a useful clinical marker for predicting relapse, was measured at baseline and week 12. Microbial profiling in the stool samples was analyzed by 16S ribosomal RNA sequencing.

The primary objective of the study was to ascertain whether a Mediterranean diet has the potential to reduce disease activity as measured by the SCCAI score at week 12. A reduction of SCCAI above 1.5 was considered clinically significant. The secondary objective was to investigate possible changes in the fecal calprotectin concentration and the gut microbiome.

Results

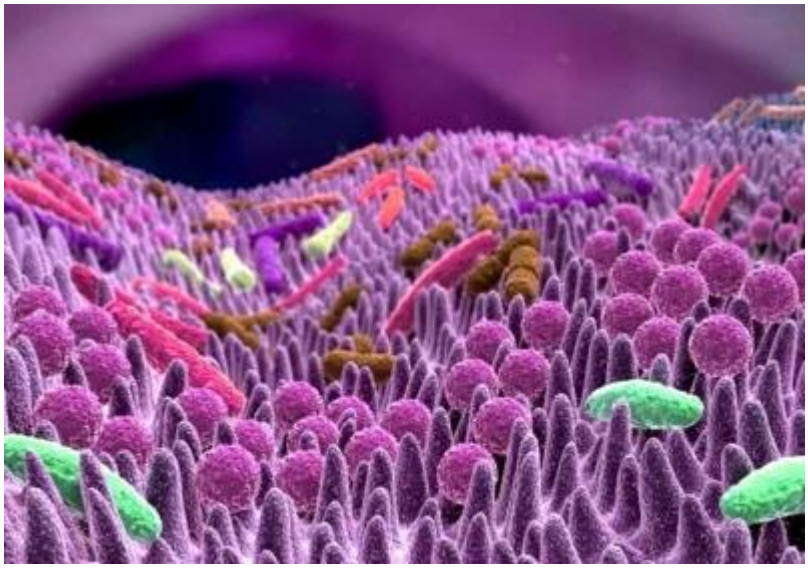
The Mediterranean diet/ Canadian habitual diet and disease activity

In patients with mild and moderate disease on the Canadian habitual diet, the Partial Mayo Score, which assesses disease activity, increased by 46% at week 12, while its increase was 33% in patients with mild disease on the Mediterranean diet.

Most participants in both groups had a fecal calprotectin concentration of less than 100 µg/g at baseline. In patients on the Mediterranean diet, 87% had a fecal calprotectin concentration below 100 µg/g after 12 weeks, and the fecal calprotectin concentration remained unchanged during the whole study. In contrast, in patients on the Canadian habitual diet, only 25% had a fecal calprotectin concentration below 100 µg/g after 12 weeks, and the fecal calprotectin concentration increased after 12 weeks compared to the baseline concentration.

The Mediterranean diet significantly increased fecal sIgA levels, which are implicated in mucosal immunity by binding pathogenic bacteria and ultimately influencing the microbiota composition. The Canadian habitual diet did not change the fecal sIgA concentration.

Patients on the Mediterranean diet had higher levels of total fecal short-chain fatty acids, acetic acid, and butyric acid than the Canadian habitual diet group. Fecal short-chain fatty acids are produced by microbes and have important immunomodulatory properties. Previous studies have shown that patients with inflammatory bowel disease have lower total fecal short-chain fatty acid levels and reduced abundance of bacteria that produce total fecal short-chain fatty acids compared to healthy controls.



The Mediterranean diet/ Canadian habitual diet and the gut microbiome

The Mediterranean diet reshaped the gut microbiome, triggering changes in the microbial species that play a protective role in colitis. Of the top 10 taxa most positively associated with the Mediterranean diet, 9/10 taxa belong to the phylum Firmicutes, class *Clostridia,* and mainly *Clostridium* subclusters IV *(Ruminococcus* spp., *Flavonifractor* spp), subcluster XIVa *(Clostridium* M, *Blautia A)*, and *Lactococcus* spp. One taxon belongs to the phylum Bacteroidota, genus *Alistipes*. According to previous studies, some of these species have a protective role in rodent models of colitis or are involved in the degradation of compounds from food substrates that regulate host health (*Clostridium boltae*, *Ruminococcus bromii*, *Blautia A* spp., and *Lactococcus lactis).* The genera negatively associated with the Mediterranean diet belong to opportunistic pathogens, such as *Veillonella dispar*, *Veillonella obetsuensis*, *Prevotella copri*, and *Streptococcus australis.*

Conclusion

This study has shown that the Mediterranean diet, compared to the habitual diet, induced changes in the gut microbiome, reduced fecal calprotectin concentrations, and increased fecal short-chain fatty acid levels. The authors concluded that the Mediterranean diet is a healthy dietary pattern. It may be recommended to patients with remission of ulcerative colitis to prevent relapse, in addition to their standard medical therapy.

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