

Are Parasitic Infections a Solution in the Treatment of Celiac Disease?

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Abstract In this issue, Rahmoune et al. present two pediatric patients with infectious associations leading to a transient positive celiac disease serology. The question is: Are parasitic infections a solution for the treatment of celiac disease?

Keywords: *celiac disease, parasitic infections, benefit*

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1. Introduction

Celiac disease (CD) is an immune-mediated disorder triggered by gluten ingestion in genetically predisposed people, furthermore, it remains a disease with only one available treatment: the gluten free-diet. However, recent studies are suggesting that parasites may improve the outcome of CD patients [1]. So far parasites have been used in the treatment of disease such as inflammatory bowel diseases: Chron's disease, ulcerative colitis, chronic idiopathic colitis, asthma [2,3].

2. The Beneficial Effects of Parasitic Infections on CD Patients

One study conducted by Croese et al. on 12 CD patients inoculated with *Necator americanus* larvae undergoing a gluten-diet concluded that helminths stimulate gluten tolerance among CD patients. Moreover, after gluten intake the villous atrophy did not increase, IgA-tissue transglutaminase titers declined and the quality of life improved. However, intra-epithelial lymphocytes, Marsh scores remained unchanged [4]. Furthermore, another study compared a group of 10 CD patients with 10 CD patients inoculated percutaneously with 10 infective larvae of *Necator americanus*. After 20 weeks both groups underwent a gluten diet for 5 days. The duodenal biopsies revealed that the levels of IFN- γ , IL-17A declined in the hook-worm group compared to the control group [5].

3. Parasites could improve the dysbiosis in CD patients

Another important aspect of parasitic infections is the effect on the gut microbiota. Giacomini P et al conducted a study on 8 CD patients undergoing gluten-free diet which were infected with *Necator americanus* larvae diet and a CD control group revealed that there are differences between the fecal microbiota of the helminth infected group and the control group after gluten intake. While in the control group the *Firmicutes* were more abundant, in the helminth infected group phylum Bacteroidetes was more profuse. It was suggested that hookworm infection helps the intestinal microbiota homeostasis by increasing the microbial species richness [6]. More studies are needed in order to improve our apprehension on the helminth-microbiota-host relationships [7]. However, another double-blinded placebo controlled trial conducted by Daveson et al concluded that the infection with *Necator americanus* although it proved to be safe, there are no concrete benefits from a pathological point of view [8].

4. Opportunistic Infections are More Frequent in CD Patients

In CD patients due to the villous atrophy and reduced immunity, bacterial, viral and parasitic infections may develop faster than in healthy subjects [9]. *Blastocystis hominis* more than five per field it should be considered

opportunistic in symptomatic patients with subtotal-total villous atrophy and low weight [10]. Furthermore, *Giardia lamblia* infection symptoms, serological and histopathological aspects resemble with celiac disease, thus it is recommended a fecal test to be conducted in order to exclude *G. lamblia* infection [11].

5. Conclusions

In CD patients some parasitic opportunistic infections may occur with parasites such as: *Blastocystishominis*, *Giardia lamblia*. Moreover, with a newly diagnosed patient parasitic infections should be excluded. However, recent studies have shown the benefit of parasite inoculation on CD patients: reduced levels of IFN- γ , IL-17A in the duodenal mucosa, stable villous atrophy, decrease in IgA-tissue transglutaminase titers, improving the gut microbiota richness. However, more trial studies are required in order to design a pharmaceutical agent available for CD patients.

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