Importance of Bifidobacteria in Crohn's Disease

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Abstract
E0392
(S1010)

Introduction

- Crohn's disease affects approximately 180/10,000 individuals, with a healthcare burden in the billions of dollars (1, 2).
- Etiology of Crohn's disease is believed to involve disruption to the microbiome, immune system processes, and genetic predisposition.
- Fecal transplant and intracolonic administration of certain *Bifidobacterium* species may resolve symptoms and improved mucosal healing (3, 4).
- The purpose of this study was to investigate the presence of genus *Bifidobacterium* in patients with Crohn's disease virgin to treatment, patients with Crohn's disease in treatment, and healthy controls.

Methods

We determined the Relative Abundance of *Bifidobacterium* in two groups of patients with Crohn's disease: treated asymptomatic vs untreated symptomatic, compared to healthy controls. Medications included Humira, Stelara, Remicade, Methotrexate, Enteragam, prednisone, low dose naltrexone, Entevio. No patients were on probiotics prior to stool collection. This study was IRB approved. Metagenomic Next Generation Sequencing was performed on fecal samples, where DNA samples were extracted and normalized for library downstream analysis using Shotgun Methodology. The Kruskal Wallis test was used to compare *Bifidobacterium* Relative Abundance levels between study groups.

Results

Study Group	Relative Abundance of *Bifidobacterium* (Median, IQR)
Control (n=20)	4.18%, 1.72-10.27%
Untreated symptomatic (n =12)	0.05%, 0.00-0.46%
Treated asymptomatic (n=15)	2.35%, 1.16-6.53%

Table 1. Relative Abundance of *Bifidobacterium* between groups

- $p < 0.0001$ for comparing Relative Abundance in untreated symptomatic patients vs. controls.
- $p = 0.0006$ for comparing Relative Abundance in untreated symptomatic vs. treated asymptomatic patients.
- $p > 0.999$ for comparing Relative Abundance in in treated asymptomatic patients vs. controls.

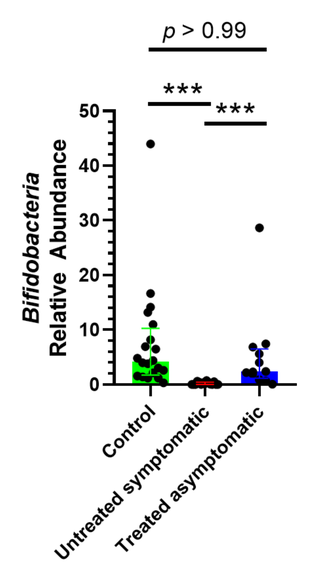

Figure 1. Genus *Bifidobacterium* decreases in abundance in untreated symptomatic Crohn's patients, but is restored in treated asymptomatic patients, compared with controls.

Discussion

- This study is the first to explore the role of monitoring the Relative Abundance of *Bifidobacterium* in assessing treatment success in patients with Crohn's Disease.
- Relative Abundance levels of *Bifidobacterium* were significantly decreased in untreated symptomatic patients vs. health controls, and in untreated symptomatic vs, treated asymptomatic patients.
- Results suggest hope for therapies that predominantly focus on implantation of *Bifidobacterium* or whole stool for Crohn's disease therapy.

References
1. Ye Y, Manne S, Treem WR, Bennett D. Inflamm Bowel Dis. 2020;26(4):619-625.
2. Bounthavong M, Li M, Watanabe JH. Res Social Adm Pharm. 2017;13(3):530-538.
3. Bozkurt HS, Banu K. Eur J Inflamm. 2020;18;1-7.
4. Paramsothy S, Kamm MA, Kaakoush NO, et al. Lancet. 2017;389(10075):1218-1228.