Introduction

Inflammatory Bowel Syndrome (IBS) refers to disordered gastrointestinal activity represented through chronic abdominal pain and altered bowel habits. It is the most common functional GI disorder in the US affecting 10-25% of the population and costing about $1.6 billion in annual healthcare spending.1

IBS treatment varies widely, including diets, exercise, stress management, supplements, and pharmaceuticals. However, the disease lacks a methodical treatment algorithm, especially in relation to integrative medicine solutions such as diet, supplements, and probiotics.2,3

This research will work to establish a data-driven, integrative medicine methodology for IBS with a focus upon diet, supplements, and probiotics. After initial intake, patients presenting with IBS will be assessed to identify patterns in stool samples and brain imaging in comparison to healthy controls. The research presented here examines the stool samples and brain imaging studies of IBS patients before the medical and lifestyle intervention.

Methods

Study participants are recruited if they are already presenting to the Marcus Institute of Integrative Health for care of their IBS. Participants must be over 18 years old, meet the ROME III criteria for IBS, and have no other pre-existing and active significant medical, neurological, or psychological disorders.

At the initial study visit, participants complete a diet habit survey, an IBS symptom diary, a self-evaluation questionnaire, the Beck depression inventory, and the SF-36 questionnaire. In addition to the surveys, participants undergo a whole-body PET-MRI scan and are instructed on how to collect and return a stool sample. At the completion of the visit, participants are counseled on the intervention they will follow for the subsequent two months.

The study intervention includes integrative diet counseling, Proguard 100 probiotic (1 capsule per day), GlutaCore powder (1 scoop per day), and Fiber Boost (1-3 capsules per day as tolerated).

At the completion of the two month intervention, patients return to the Marcus Institute for a follow-up visit. Patients complete the surveys again, undergo a second PET-MRI scan, and complete a second stool sample.

Control subjects undergo PET-MRI scans, but do not give stool samples. The stool samples are analyzed by Genova Diagnostics, which provides normal ranges for comparison.

Results

At the time of this poster, five patients have been enrolled in the study, and none have completed the intervention yet. Data from four PET-MRI scans was available for analysis, and data from two stool samples was available for analysis. Six control subjects have undergone PET-MRI scans.

PET Imaging:

In comparison to the control subjects, the brains of the IBS patients show significantly different metabolism (p< 0.05) in the following areas:

- Anterior cingulate gyrus
- Hippocampus
- Inferior frontal gyrus
- Superior frontal gyrus
- Middle temporal gyrus
- Middle occipital gyrus

PET scans are normalized to the thalamus. The PET scan of the IBS patient shows increased metabolism throughout the cortex in comparison to the control subject. This could be related to heightened sensitivity and pain perception in the IBS patient.

Stool Sample:

Patients presented with varied data. Both patients demonstrated a reduction in beneficial bacteria, such as the Ruminococcus species, and abnormal short-chain fatty acid ratios (products of colonic carbohydrate fermentation). This reduction contributed to a consistently low Firmicutes:Bacteroidetes (FB) ratio.

Patients showed high levels of inflammatory markers, most consistently fecal secretory IgA. Both patients were negative for parasites, ova, and occult blood.

Conclusions

The research presented here indicates that there are areas of the brain that have different metabolic activity between IBS patients and controls. This finding reinforces the current research pointing to a connection between the brain and the gut as part of the pathophysiology of IBS.4 Additionally, other studies on the pathophysiology of IBS have shown different levels of activity in the anterior cingulate gyrus, the inferior frontal gyrus, the middle temporal gyrus, and the middle occipital gyrus between controls and IBS patients.5, 6, 7 The research presented here shows different levels of activity in these same areas. Despite these initial promising results on the link between the brain and IBS, more participants are needed to be able to generalize these findings to all IBS patients.

Other studies have noted a high FB ratio in IBS, IBD, and diabetic patients.5 Interestingly, the data presented here did not support this finding as all patients presented with an abnormally low FB ratio. Further analysis of diet and patient symptoms is needed to understand the drivers of the FB ratio and how these species affect colonic fermentation and absorption. With the small sample size, it is difficult to determine whether this contrasting data is consistent across patients or if it is comprised of outliers.

As more patients are enrolled, this research will be more able to inform current IBS treatment approaches with the hopes of finding relief for IBS sufferers.

References


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