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FLOWERS OR FLORA?: UNDERSTANDING THE EFFECTS OF PROBIOTICS ON DEPRESSION

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Background

Chances are, we all know someone who has had their life affected by depression and anxiety; and we have all experienced these feelings on some level. What if the key to unlocking these problems lied within every one of us -- inside of our gut? The research topic being explored is the relationship between gut health and mood disorders. The question of interest is: Does the use of probiotic supplementation have an effect on feelings of depression?

Connection between gut health and mental health is significant as approximately 6.7% of adults in the U.S. suffer from major depressive disorder. There has been an observed association between gut health disorders and mood disorders, mainly anxiety and depression. Those who demonstrate anxiety and depression have an increased likelihood of developing abnormal gastrointestinal (GI) symptoms. This raises the possibility of *bi-directionality* between the brain and the gut, meaning that GI health may have an effect on mental health and vice versa.

This relationship is important to explore. Probiotics, bacteria that are beneficial to the body, have grown in popularity as a gut health supplement which may have an affect on the brain. There is much reason to suspect and explore the relationship between probiotic supplements and depression.

Search Strategies

Multiple peer-reviewed journals found through the Dominican University library databases: ScienceDirect and CINAHL. Eight articles were selected to give a holistic view of the brain-gut pathway and how probiotics affect the brain.

Key search terms: probiotics, correlation, depression

Research Findings

Randomized Control Trials: Probiotic *Lactobacillus plantarum* P8 alleviated stress and anxiety while enhancing memory and cognition in stressed adults (2018)

Goal of the experiment was to investigate effects of probiotics (*Lactobacillus plantarum* P8) on the alleviation of stress in stressed adults. Subjects were tested for psychological distress using the Perceived Stress Scale questionnaire, and the Depression, Anxiety, and Stress Scale (DASS-42), every four weeks. Memory and cognitive functions were tested at baseline and periodically thereafter. During week 4, 8, and 12 the P8 group had much lower stress than the control. The DASS-42 attributes this to reduction of "touchiness", reduced irritation, increased calmness, and increased tolerance against interruptions. This shows that *L. plantarum* P8 may have a potential future as an anxiolytic supplement.

Stress matters: Randomized controlled trial on the effect of probiotics on neurocognition (2019)

Research team set out to investigate effects on neurocognitive measures of emotion. They wanted to test whether probiotics could be used to buffer against the effects of stress on memory in a randomized, double blind, placebo-controlled trial. These results indicated that the group taking probiotics had developed a larger buffer against the negative effects of stress on their memory.

Original Research: Probiotic *Bifidobacterium longum* NCC3001 Reduces Depression Scores and Alters Brain Activity: A Pilot Study in Patients With Irritable Bowel Syndrome (2017)

Conducted research on the probiotic *Bifidobacterium longum* NCC3001 to evaluate its effects on anxiety and depression for patients with irritable bowel syndrome. Anxiety and depression were analyzed by the Hospital Anxiety and Depression Scale. Blood, stool, and urine samples were collected. MRIs were used to assess brain activity. At 6 weeks, the patients in the *B. longum* group had decreased depression compared to the placebo group. No changes were found for patients with anxiety. Depression and anxiety are related to amygdala hyperactivity but both SSRIs and *B. longum* were able to benefit the patient by decreasing its activity. This shows how probiotics may be able to take a stand in the world of antidepressants.

Effect of *Lactobacillus rhamnosus* HN001 in Pregnancy on Postpartum Symptoms of Depression and Anxiety: A Randomised Double-blind Placebo-controlled Trial (2017)

Evaluate the effects of bacteria on maternal anxiety and depression during postpartum period. The Edinburgh Postnatal Depression Scale and State Trait Anxiety Inventory was used to help mothers describe their psychological wellbeing from when their child was 1 to 2 months old. This was done at 6 or 12 months postpartum. Number of women who reported clinically significant depression above the standard cut-off did not differ between the HN001 group and the placebo group. However, women receiving the HN001 treatment were significantly less likely to have anxiety above the cut-off point.

Conclusions

The primary question of interest, "does the use of probiotic supplementation have an effect on feelings of depression?" was answered. Effects of these bacteria can include relief of depressive symptoms along with relief from stress and anxiety. *Lactobacillus plantarum* P8, *Bifidobacterium longum* NCC300, and *Lactobacillus rhamnosus* HN001 are three specific probiotic strains that have demonstrated effects on depression and anxiety. Findings show that different probiotics have different effects on the mind.

Health care professionals can develop new ways of treating depression and anxiety. When a patient is newly diagnosed with depression, the use of psychotherapy and probiotics could be the first line of treatment before switching to pharmaceutical drugs like selective serotonin reuptake inhibitors. Perhaps probiotics will be so well-studied that they become the more natural solution to mental health crises and replace pharmaceuticals as the standard of care.

Proposal For Further Study

Question of Interest

Which probiotic decreases symptoms of depression in the fastest and most significant way - *Bifidobacterium longum* NCC300, *Lactobacillus plantarum* P8, or both?

Sampling

A minimum sample of 500 patients age 18-65 who have been diagnosed with depression.

Methods

This is a randomized, double-blind, placebo-controlled study. Subjects will be interviewed at baseline and depression scores will be evaluated using the Depression, Anxiety and Stress Scale 42 and Beck Depression Inventory II. Subjects will then be randomized and receive either control, *Bifidobacterium longum* NCC300, *Lactobacillus plantarum* P8 group, or the combination group. Subjects will be instructed to take their sample every day at approximately the same time each morning. Depression scores will be reevaluated using the same scales at 6 weeks and 12 weeks.

Analysis

In order to analyze the data from the four groups; NCC300, P8, combination, and placebo; a one-way analysis of variance (ANOVA) should be performed. This form of analysis can be used to determine whether there are statistically significant differences between the four groups.

