Probiotics and the gut-brain axis

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A recent study published in *Brain, Behavior, and Immunity* has found that intake of multispecies probiotics has a beneficial effect on cognitive reactivity to sad mood in a randomized controlled trial.

For many years, the sole origin of mood disorders has been traced back to dysfunctional neurotransmitter systems in the brain. However, recent evidence has suggested an important role for the gut, specifically gut microbiota, in anxiety and depression. There is bidirectional communication along the gut-brain axis, a circuit composed of the gastrointestinal, central and autonomic, and immune systems, which is largely regulated by microbiota. This circuit can modulate metabolism and energy, as well as inflammation. Thus, a disruption in the balance of the microbiota system in the gut can greatly affect general health and wellness.

An important study published in 2004 first demonstrated a link between microbiota and anxiety and depression. Mice without normal gut microbiota expressed higher levels of ACTH and corticosterone levels in response to restraint stress. In addition, these mice had lower levels of BDNF expression in key brain regions that play an important role in regulating anxiety and depression. These results were partially reversed by administration of probiotics. Although these data were collected in animal models, they suggested an important role for probiotics in patients with depression. In addition, approximately 30% of patients with MDD (major depressive disorder) also suffer from irritable bowel syndrome (IBS) and IBS patients have dysfunctional gut microbiota, which is related to their condition.

Based on these correlative findings, treatment with probiotics has been proposed as a potential adjunctive therapy for patients with MDD. A randomized controlled trial led by the corresponding author Lorenza S. Colzato and her colleagues evaluated the effects of probiotics administration on cognitive reactivity in a population of healthy participants. Forty non-smoking young adults with no psychiatric or neurological disorders and no personal or family history of depression or migraine were randomly assigned to receive either probiotics or placebo over a period of four weeks (n=20 in each group).

The probiotics supplement contained the strains Bifidobacterium bifidum W23, Bifidobacterium lactis W52, Lactobacillus acidophilus W37, Lactobacillus brevis W63, L. Casei W56, Lactobacillus salivarius W24, and Lactococcus lactis (W19 and W58). Before and after the four-week trial, participants were screened with questionnaires that assessed changes in cognitive reactivity. The LEIDS-r questionnaire was used to evaluate feelings of aggression, suicidality, coping, control, risk aversion, and rumination, while the Beck's inventories were used to assess clinically valid indicators of anxiety or depression.

LEIDS-r questionnaire subscale

- Aggression (e.g. When I feel down, I lose my temper more easily)
- Hopelessness/Suicidality (e.g. When I feel down, I more often feel hopeless about everything; When I feel sad, I feel more that people would be better off if I were dead)
- Acceptance/Coping (e.g. When I am sad, I feel more like myself)
- Control/Perfectionism (e.g. I work harder when I feel down)
- Risk aversion (e.g. When I feel down, I take fewer risks)
- Rumination (e.g. When I feel sad, I more often think about how my life could have been different)

After four weeks of supplementation, participants taking probiotics exhibited significantly reduced levels of self-reported aggression, rumination, and overall cognitive reactivity compared to those taking placebo. However, there was no effect on the Beck's scores for anxiety or depression.

This study is the first human trial to evaluate the effect of probiotic supplement on cognitive reactivity. Although these findings are preliminary and the study was performed on healthy participants instead of a clinical population, the results are quite encouraging after only a short period of probiotics supplementation. For now, keep eating that yogurt and stay tuned for future studies!

More information: Laura Steenbergen et al. "A randomized controlled trial to test the effect of multispecies probiotics on cognitive reactivity to sad mood," *Brain, Behavior, and Immunity* (2015). DOI: 10.1016/j.bbi.2015.04.003

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