

Probiotics: The Search for Bacterial Balance

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The human body is host to a multitude of colonizing bacteria strains, collectively known as the microbiome. Despite their small size, bacteria are quite prevalent, exceeding our own cell count by a factor of 10, and play an important role in both atopic dermatitis (AD) and overall skin health. Recent studies show that patients with atopic dermatitis have a highly abnormal balance of bacteria on the skin, with an excess of undesirable bacteria such as *Staphylococcus aureus*.¹ Such deviation from the normal epithelial microbiome is thought to directly drive skin inflammation. In an attempt to reduce unwanted bacteria and improve atopic dermatitis, the practice of dilute bleach baths has been studied with impressive results.²

However, early 20th century scientist Élie Metchnikoff's proposal that certain bacteria in the human body are potentially beneficial and serve as a natural barrier against disease has sparked our modern day interest in probiotics.³ In 2008, the National Institutes of Health launched the Human Microbiome Project, a massive research collaboration to map all microorganisms associated with the human body. In addition to analyzing the diversity of our microbiome, this project seeks to measure its impact on a variety of acute and chronic health conditions including eczema, common respiratory illnesses, obesity, diabetes, and autoimmune conditions such as Crohn's disease. The project's goal is to support greater use of probiotics to restore healthy bacteria in addition to—or perhaps in lieu of—antibiotics that kill harmful bacteria, thus regenerating a healthy, balanced microbiome.⁴

CAN PROBIOTICS TREAT DISEASE?

Despite research efforts, issues of quality control and lack of standardized protocols have resulted in inconsistent data on probiotic effectiveness, and clinical evidence on usage of specific probiotic strains to treat or prevent disease is limited. However, the most promising studies focus on prevention and treatment of gastrointestinal diseases, specifi-

cally traveler's diarrhea, antibiotic-associated diarrhea,⁵ and irritable bowel syndrome,⁶ citing improvement of associated symptoms. Research also suggests that probiotics may help resolve childhood respiratory infections and genitourinary infections, as well as atopic dermatitis and allergic diseases.⁷

Based on such clinical evidence, the American Academy of Family Physicians provides the following recommendations regarding probiotic use⁸:

- Probiotics may reduce the incidence of antibiotic related diarrhea.
- Probiotics may reduce the duration and severity of all-cause infection diarrhea.
- Probiotics may reduce the severity of pain and bloating in patients with irritable bowel syndrome.
- Probiotics may reduce the incidence of atopic dermatitis in at-risk infants.

ECZEMA PREVENTION

Provided that the bacterial flora is very different in patients with atopic dermatitis, the concept of reincorporating healthy bacteria to restore microbiome balance is compelling. Recently, researchers have been exploring the use of prenatal and postnatal probiotic supplements in high-risk mother-infant pairs with aim to reduce the incidence of eczema in the child.

In 2009, the Probiotics and Allergy trial studied a multi-strain probiotic composed of three bacteria known for their anti-inflammatory effects: *Bifidobacterium bifidum*, *Bifidobacterium lactis*, and *Lactococcus lactis*.⁹ Trial participants received either a multi-strain probiotic or a placebo administered prenatally (six to eight weeks prior to delivery) and post-natally (infants were supplemented for 12 months). At three months of age, fecal colonization with *Bifidobacterium* was confirmed in 100 and 85 percent of the probiotic group and control group, respectively. Blood analysis measuring levels of inflammatory markers revealed lower levels in the probiotic group, suggesting some anti-inflammatory effect. Lastly, a significant difference in the

THE CONS OF PROBIOTICS

In the US, probiotics are regulated as “dietary supplements” and are therefore not required by the FDA to adhere to quality control measures ensuring purity, potency, and safety. While the majority of commercially available probiotic strains are considered safe, immunocompromised populations may be at increased risk for negative side effects, including *Lactobacillus* sepsis, an infection directly linked to probiotic supplements.¹⁶ Perhaps creating a class of probiotics that are regulated to more stringent standards would assist in their use as an effective dermatological treatment regimen, or at least help sort out some of the conflicting data.

physician-reported incidence of eczema was observed: 23 percent versus six percent in the control and probiotic groups, respectively.

A meta-analysis of 14 trials supports this study by revealing that probiotics supplements decreased the incidence of atopic dermatitis, regardless of prenatal or postnatal use.¹⁰ Similarly, a 2012 review found that administering *Lactobacilli* probiotic strains during pregnancy resulted in a significant reduction of eczema in children between the ages of two to seven years.¹¹ Likewise, a study published October 2012 in *The Journal of Allergy and Clinical Immunology* found that probiotic strains of *Lactobacillus rhamnosus* and *Bifidobacterium longum* or *Lactobacillus paracasei* and *Bifidobacterium longum* reduced the incidence of eczema in high-risk infants for up to two years of age.¹² For this study, 241 breastfeeding mother-infant pairs were supplemented with probiotics during the two months prior to delivery and during the first two months of breastfeeding.

ECZEMA TREATMENT

When dissatisfied with conventional medicine, patients and parents often turn to alternative and complementary medical treatments to manage eczema.¹³ Thus, the role of probiotic therapy as a treatment for established atopic dermatitis has been an important question in recent years. However, research focused on probiotic use to treat eczema has not yielded promising results. A 2008 review of 12 trials comparing the use of probiotics and placebos observed no difference in respective outcomes, with a slight increased risk of adverse effects, such as infections and bowel ischemia, among those using probiotics.¹⁴ Additionally, a more current review of clinical studies did not find convincing evidence to recommend the use of probiotics for treatment of eczema.¹⁵

Despite disappointing reviews, high (3-50 billion CFU/d) single or multistrain doses of *Lactobacillus rhamnosus*, *Bifidobacterium lactis*, and *Lactobacillus acidophilus* are currently the most promising probiotic formulations for

prevention and treatment of eczema. Still, additional studies evaluating precise dosing and the effectiveness of single versus multi-strain probiotics are necessary to confirm the most beneficial bacterial regime.

CONCLUSION

While probiotic treatments have shown promise in some research studies, other reports have shown little to no benefit of probiotic supplementation in the prevention or treatment of atopic dermatitis. Many questions remain regarding appropriate bacterial strains, optimal dosing, and timing of treatments. However, it is possible that answering such questions will allow to clinicians to harness the power of probiotics and effectively use it in preventing and managing eczema. ■

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