Could an ancient plant compound hold the key to metabolic harmony?

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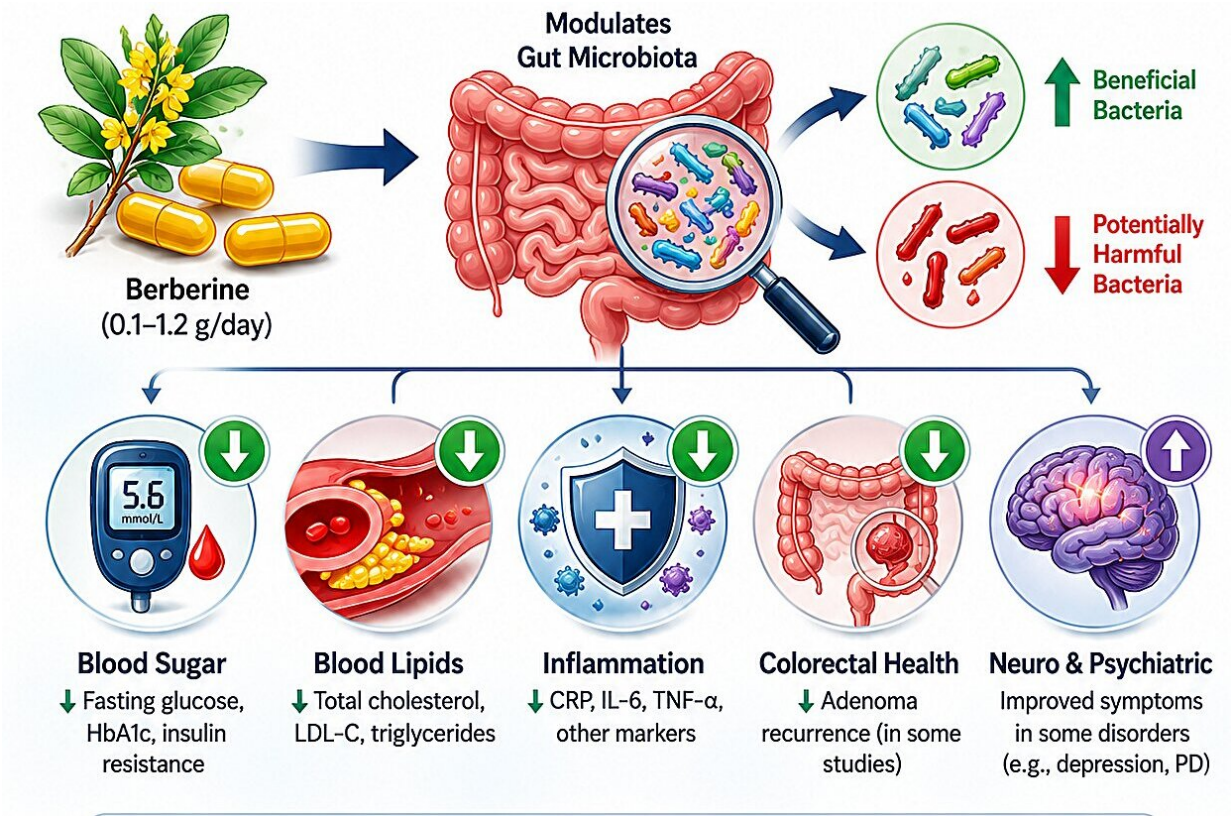

Berberine appears to reshape gut microbial communities while improving markers linked to blood sugar, cholesterol, and inflammation, according to a review of seven randomized clinical trials. Credit: Created by the author using generative AI for illustrative purposes.

For centuries, the secrets of traditional medicine were locked away, and

only recently have they come to light. Imagine an ordinary yellow plant extract, widely used in Chinese medicine, exerting effects not only on blood glucose and lipid metabolism but also at the body's core: the gastrointestinal tract.

Berberine, an ancient herbal remedy, has long been recognized for its beneficial metabolic properties, while the full extent of its effects remained unknown. However, the latest analysis shows unexpected ways in which this natural plant compound can affect the gut flora in our bodies. Could this ancient substance play an important role in controlling our microbial flora?

The possibilities are enormous, particularly since researchers have shown a connection between dysbiosis—the disruption of the delicate balance of the bacteria within us—and various illnesses, ranging from type 2 diabetes and obesity to cardiovascular disease.

A systematic review, published in the journal *Nutrients*, compiled from randomized clinical studies, provides the most detailed information to date about the interactions of berberine with our gut microbes.

Gut microbiome in metabolic health

Scientists have tied imbalances in gut bacteria—often called "dysbiosis"—to chronic conditions like type 2 diabetes, obesity and heart disease. A leaky, inflamed gut appears to drive poor metabolism. This makes any compound that shifts gut bacteria a compound of great interest. Lab and animal studies have already hinted at this: berberine can boost beneficial gut bacteria and reduce inflammation.

The new review gathered seven randomized trials, all from China, that gave adults berberine supplements and examined their gut flora. Each trial ranged from a few dozen to several hundred participants and lasted

from three months to two years. Participants included people with diabetes, high cholesterol, colon polyps and even certain psychiatric or neurological disorders.

Berberine's double-edged microbial dance

When all the trials were considered together, the following picture emerged: berberine consistently influenced the gastrointestinal microbiota of patients in various groups, and this was often associated with improvements in cardiovascular and metabolic measures, as well as reduced inflammation. In simple terms, patients taking berberine often saw decreases in blood glucose, cholesterol and inflammation levels alongside shifts in gut bacteria.

But such microbial manipulation was not always necessarily beneficial. In some cases, it resulted in an increased presence of microbes that can induce inflammation. For example, in some of the diabetes studies, researchers found that berberine increased some gut bacteria linked to inflammatory responses while at the same time decreasing beneficial bacteria that aid in fiber digestion and produce beneficial metabolites.

As the authors of the paper warn, "Compositional changes were not universally beneficial and should be considered hypothesis-generating." Such changes in gut bacteria could be side effects of the experiments or new leads to follow up on, but we cannot say with certainty that they cause the benefits.

Cautions, caveats, and next steps

However, the trials themselves have limits. All were conducted in China, so it is not known whether the findings apply globally. Study designs also varied: patient groups, berberine doses and treatment durations weren't

consistent. Many trials used roughly 1 gram per day, but exact amounts differed. The lab methods for profiling gut microbes also varied across trials, complicating comparisons.

Researchers say future studies need standardized microbiome analyses and more diverse participants. Ideally, new trials will carefully track exactly how specific microbial changes relate to outcomes like blood sugar or cholesterol improvements.

What does it mean for you?

Berberine supplements might sound like a quick fix, and indeed, some experts suggest they can help manage blood sugar and cholesterol. It's even been tested to prevent colon polyps—in a six-year Chinese study of nearly 800 patients, berberine roughly halved polyp recurrence. It has also been explored for neurological and psychiatric conditions.

But the new review suggests the benefits may depend on each person's unique microbiome and health. For now, it's a reminder that the microbes in our gut are part of the metabolic story—and that medicines can flip that balance for better or worse.

The authors emphasize that more diverse trials are needed to understand who truly benefits from berberine's microbial makeover. In the end, the takeaway is that berberine genuinely changes gut bacteria—a fascinating clue rather than a final verdict, and a reminder that the benefit of any treatment can depend on an individual's microbiome.

More information: Adelin-Rareș Candrea et al, The Integrative Role of Berberine in Gut Microbiota Modulation and Cardiometabolic Outcomes: A Systematic Review of Randomised Clinical Trials, *Nutrients* (2026). DOI: 10.3390/nu18121858