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Natural probiotics through food: what do the large clinical trials show?



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Abstract

Intake of fermented foods (such as yoghurt, kefir, kombucha, sauerkraut and kimchi) has gained enormous popularity as a natural way to optimise the gut microbiome. Large clinical studies and systematic reviews show that fermented food differs markedly from capsules: foods deliver not just isolated bacterial strains, but a complex ecosystem of live microorganisms, bioactive peptides and organic acids. This article reviews the scientific evidence for the most important natural probiotic sources and their measurable effects on human health.

Introduction

Before industrialisation and the invention of dietary supplements, humans obtained their probiotic bacteria exclusively through fermentation - an ancient preservation method in which bacteria and yeasts break down carbohydrates in food.

When we eat fermented food, we ingest live microorganisms in their natural "food matrix". More recent clinical research has increasingly focused on whether these natural sources actually survive the trip through stomach acid and alter our gut flora and health on a par with - or perhaps better than - isolated capsules. See also our article on [probiotics in capsule form](#) and the overview of [gut microbiome, probiotics and IBS](#).

The most important natural probiotic sources and their evidence

1. Kefir (lactic acid and yeast fermentation)

Kefir is a thin, sour drink made by fermenting milk with "kefir grains" (a symbiotic culture of bacteria and yeast).

- **What does it contain?** Typically an extremely rich composition of *Lactobacillus kefir*, *Leuconostoc*, *Acetobacter* and beneficial yeasts such as *Saccharomyces kefir*.
- **Clinical results:** Large systematic reviews of randomised clinical trials (RCTs) show that regular kefir intake has a significant positive effect on the gut microbiome, improves lactose tolerance, reduces inflammation (measured on markers such as IL-6 and TNF-alpha), and can help lower total cholesterol [1].

2. Traditional yoghurt and cultured dairy products

Yoghurt is the most well-studied source of probiotics in the Western world. However, one must distinguish sharply between pasteurised industrial yoghurt (where the bacteria have been killed by heat) and yoghurt with live, active cultures.

- **What does it contain?** As standard, *Lactobacillus bulgaricus* and *Streptococcus thermophilus*. Many products are also enriched with *Lactobacillus acidophilus* and *Bifidobacterium*.
- **Clinical results:** Large meta-analyses of clinical trials confirm that a daily intake of yoghurt with live cultures markedly improves digestion in people with lactose intolerance [2]. In addition, large population studies and smaller RCTs show a direct

association between regular yoghurt intake and a reduced risk of developing type 2 diabetes, as well as lower levels of systemic inflammation [2, 3].

3. Kimchi and sauerkraut (fermented vegetables)

Kimchi (a spicy Korean national dish of fermented napa cabbage and radish) and sauerkraut are based on wild fermentation, in which the vegetables' own bacteria mature the food.

- **What do they contain?** Dominated by lactic acid bacteria, including *Leuconostoc mesenteroides*, *Lactobacillus plantarum* and *Lactobacillus sakei*.
- **Clinical results:** Randomised controlled studies have shown that kimchi has a surprisingly broad metabolic effect. In addition to optimising the bacterial composition of the gut, controlled trials have shown that kimchi can improve insulin sensitivity, reduce body fat percentage and lower blood pressure in overweight subjects [4]. The live bacteria work closely here with the vegetables' high fibre content (prebiotics).

4. Kombucha (fermented tea)

Kombucha is a sparkling, fermented tea brewed using a SCOBY (a flat culture of bacteria and yeast).

- **What does it contain?** Primarily acetic acid bacteria (*Komagataeibacter*), lactic acid bacteria and various yeast strains, as well as a high content of antioxidants (polyphenols) from the tea.
- **Clinical results:** Although kombucha has shown strong antioxidant and antimicrobial effects in laboratory and animal experiments, more recent systematic reviews emphasise that very large, controlled human RCTs are still lacking before the specific health claims can be definitively confirmed in large populations [5]. The existing smaller studies do, however, point to a positive effect on post-meal blood sugar regulation [5].

Food versus capsules: what is the big difference?

When the large nutrition studies are compared with pharmaceutical probiotic trials, researchers highlight three unique advantages of getting probiotics through food:

The "synergistic" food matrix

In a capsule, the bacteria sit dried and isolated. In foods such as yoghurt or kefir, the bacteria are embedded in a structure of fats, proteins and carbohydrates. Clinical studies of intestinal transit show that the fats and proteins in dairy products act as a natural buffer against the harsh stomach acid, helping a markedly larger percentage of the live bacteria to reach the colon unscathed [3, 6].

The "prebiotic" partnership

Fermented vegetables such as kimchi and sauerkraut deliver both the live bacteria (**probiotics**) and the fibres they feed on (**prebiotics**). When these two elements are consumed together, the combination is called *synbiotics*. The large clinical studies show that bacteria find it far easier to take root and colonise the gut when they arrive together with their own "lunchbox" of indigestible plant fibres [4, 6].

Postbiotics: the hidden bonus compounds

During the food's fermentation process, the bacteria produce a range of by-products. These are called *postbiotics*. They include short-chain fatty acids (SCFA, e.g. acetate and butyrate), vitamins (B and K) and organic acids [6]. Large microbiology studies confirm that these substances are directly biologically active in our body; they dampen inflammation locally in the gut and strengthen the barrier function of the gut wall - regardless of whether the bacteria themselves survive or not [1, 6].

Conclusion

Whereas probiotics in capsule form are excellent for targeted, medical treatment (such as after an antibiotic course), the large nutrition-medical studies indicate that **natural fermented food is the most effective strategy for general maintenance of a healthy gut microbiome in healthy people**. The combination of the protective food structure, the high bacterial diversity and the postbiotic compounds formed makes the diet a powerful, scientifically based everyday tool.

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