

With high fiber diets, more protein may mean more bloating

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People who eat high fiber diets are more likely to experience bloating if their high fiber diet is protein-rich as compared to carbohydrate-rich, according to a study led by researchers at the Johns Hopkins Bloomberg

School of Public Health.

The researchers, whose findings were published online January 15 in the journal *Clinical and Translational Gastroenterology*, analyzed data from a clinical trial of high fiber diets. They determined that when the 164 trial participants ate versions of a heart-healthy, [high-fiber diet](#) that was relatively rich in [plant protein](#), they were about 40 percent more likely to report bloating symptoms than when eating a carbohydrate-rich version of the same high fiber [diet](#).

The study suggests that people who want to eat a high fiber diet would be less likely to experience bloating if the diet were relatively carb-rich versus protein-rich.

High-fiber diets are believed to cause bloating by boosting certain populations of healthful fiber-digesting gut bacteria species, which produce gas as a byproduct. The findings thus also hint at a role for "macronutrients" such as carbs and proteins in modifying the gut bacteria population—the microbiome.

"It's possible that in this study, the protein-rich version of the diet caused more bloating because it caused more of a healthy shift in the composition of the microbiome," says study co-senior author Noel Mueller, Ph.D., an assistant professor in the Department of Epidemiology at the Bloomberg School. "Notably, the protein in these diets was mostly from vegetable sources such as beans, legumes, and nuts."

Bloating affects about 20 percent of the U.S. adult population, and is so common as a side effect of high fiber diets that it deters many people from adopting such diets. Mueller and colleagues in recent years have been re-examining data from past, high quality [clinical trials](#) to find dietary factors that might modify bloating frequency in the context of a

high fiber diet. Last year, Mueller and colleagues reported that salt appeared to be one such factor. It was associated with more bloating in a trial of a heart-healthy, high-fiber diet, suggesting that cutting back on salt could be one easy way to reduce bloating.

In the new study, the researchers examined a dietary clinical trial that was conducted in 2003 and 2005 at the Johns Hopkins ProHealth Clinical Research Unit in Baltimore and at the Brigham and Women's Hospital in Boston. Known as the Optimal Macronutrient Intake Trial to Prevent Heart Disease (OmniHeart), it included 164 participants who had above-normal blood pressure. They were assigned to three different diets over consecutive six-week periods separated by two-week "washout" intervals during which participants returned to regular eating habits.

The diets were all considered high-fiber, low-sodium "DASH" diets, and had the same number of calories, but varied in their macronutrient emphases: a carbohydrate-rich version was, by calories, 58 percent carbohydrate, 15 percent protein, and 27 percent fat; a plant-protein-rich version was 48 percent carbs, 25 percent protein, 27 percent fat; and a fat-rich version was 48 percent carbohydrate, 15 percent protein, and 37 percent fat.

The primary results of the OmniHeart trial, published in 2005, suggested that the plant-protein-rich and fat-rich diets were the most effective in reducing blood pressure and improving measures of blood cholesterol (reducing LDL and triglycerides; increasing HDL).

In their new analysis of this data, Mueller and colleagues examined how participants' reports of bloating—which were among the secondary data collected in that trial—varied as participants ate the three OmniHeart diets. A key finding was that the prevalence of bloating went from 18 percent before the diets to 24, 33, and 30 percent, respectively, on the

carb-, protein-, and fat-rich diets—indicating that these high fiber diets did indeed appear to increase bloating.

The researchers also analyzed the relative changes among the diets, and linked the protein-rich diet to a significantly greater chance of bloating—roughly 40 percent greater—in comparison with the carb-rich diet.

The results suggest that substituting high quality carb calories, such as whole grain, for protein calories might reduce bloating for those on high fiber diets, making such diets more tolerable.

There is the possibility, however, that making high fiber diets more tolerable in this way would also make them less healthy. The plant-protein- and fat-rich diets in the study, which led to higher bloating prevalence, also appeared, in the original OmniHeart trial analysis, to lower blood pressure and improve blood lipid measures more than the carb-rich diet.

Researchers have been uncovering evidence that many of the effects of a healthier diet come from shifts in the gut microbiome that result in greater microbial production of health-promoting molecules called metabolites. Mueller suspects that the plant-protein-rich diet caused more bloating because it caused a greater and healthier shift in the microbiome.

"Bloating may be just a consequence of a healthy shift in the microbiome, so that if somebody is able to put up with the bloating caused by a high-protein, [high-fiber diet](#), they may ultimately benefit more in other health measures," Mueller says.

He and his colleagues are working on a follow-on study of the effects of similar dietary patterns on the gut microbiome.

More information: Mingyu Zhang et al, Effects of High-Fiber Diets and Macronutrient Substitution on Bloating, *Clinical and Translational Gastroenterology* (2020). [DOI: 10.14309/ctg.0000000000000122](https://doi.org/10.14309/ctg.0000000000000122)

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