

GREENS, OXALATES AND KIDNEY STONES

Kidney stones affect as many as 1 in 10 people in their lifetime and can cause excruciating pain as well as infections and potentially, even impact on kidney function. Oxalate stones are the most common type, forming when the oxalate concentration in your urine gets so high it basically crystallizes out of solution, like rock candy. Oxalic acid (aka oxalate) is an organic compound found in many plants. Your body can produce oxalate on its own or obtain it from food. Vitamin C can also be converted into oxalate when it's metabolized. Once consumed, oxalate can bind to minerals to form compounds, including calcium oxalate and iron oxalate. This mostly occurs in the colon, but can also take place in the kidneys and other parts of the urinary tract. For most people, these compounds are then eliminated in the stool or urine. However, for sensitive individuals, high-oxalate diets have been linked to an increased risk of kidney stones and other health problems.

Some foods, like spinach, have lots of oxalates in them. Other foods that are high in oxalates include:

- Leafy Greens, especially spinach, beet and chard greens (10x more than kale)
- Rhubarb and okra
- Almonds and cashews
- Miso soup
- Baked potatoes with skin and sweet potatoes
- Cocoa powder
- Bran and shredded wheat cereals
- French fries
- Raspberries
- Stevia sweeteners

People who do get stones don't seem to eat any more oxalates on average than people who don't get stones. It may be less what you eat, and more what you absorb. People who are predisposed to kidney stones just appear to be born with a higher intestinal oxalate absorption. Oxalate "super absorbers" assimilate up to "50% more oxalate than non-stone formers.

Overall, the impact of typical dietary oxalate intake on the amount of oxalates that end up in the urine "appears to be small. Even a massive dose of dietary oxalates typically only results in a mild increase in the amount that makes it into your urine. A 25-fold increase in oxalate consumption doesn't even double the concentration of oxalates in urine, so it's really more determined by genetics than diet. People who eat more fruits and vegetables actually get fewer kidney stones. When produce from people's diets was removed, their kidney stone risk went up.

There are many medical conditions that also predispose people to produce oxalate stones. Some include:

- Dehydration from not drinking enough fluid
- A diet high in:
 - Oxalates, but only if you are predisposed to stone formation for other reasons.
 - Protein, particularly animal proteins.
 - Salt.
 - Sugar, but not from whole fruit or vegetables.
- Obesity.
- Medical conditions like:
 - Dent Disease, a rare genetic disorder that affects the kidneys.
 - Hyperparathyroidism. A very high amount of parathyroid hormone, produced by small parathyroid glands near the thyroid in your neck, in the blood that causes a loss of calcium which is needed to bind with oxalate and leave the body.
- Digestive Diseases and Surgeries like::

- Ulcerative Colitis and Crohn's Disease.
- Gastric bypass surgeries.

Removing fruits and veggies can make your dietary oxalate intake go down, but your body produces its own oxalate internally as a waste product, so you have a more difficult time getting rid of it without the alkalizing effects of fruits and vegetables on urine pH. This is why those eating plant-based get fewer kidney stones, but it also may be due to their cutting animal protein intake, which can have an acid-forming effect in the kidneys. Just a single daily can of tuna fish can increase your risk of forming stones 250%. And even just cutting back on animal protein may help cut kidney stone risk by 50%.

There have been a few rare cases reported of people drinking green juices and smoothies getting oxalate kidney stones, though most had extenuating circumstances. One woman's kidneys shut down after a 10-day juice cleanse, which included two cups of spinach a day but she had had a gastric bypass, and was on prolonged antibiotics, which can both increase absorption of the oxalates in spinach. So can taking megadoses of vitamin C. A man went into kidney failure juicing spinach and beet greens, but he was also taking 2,000mg a day of vitamin C. Vitamin C is metabolized to oxalate inside the body, and likely played a role in his oxalate overload. In both cases, their juicing alone was giving them more than 1,200mg of oxalate a day, which is easy with spinach, just two cups a day, but practically impossible with most other greens, like kale, requiring more than six hundred cups a day.

Normally we might not expect a cup or two of spinach to cause such a violent reaction, but she had two aggravating factors—she had gastric bypass surgery (which can increase oxalate absorption) and a history of “prolonged” antibiotic use. There's actually a friendly bacteria you want in your colon, called oxalobacter, that eats oxalate for breakfast, leaving even less for us to absorb, but it can get wiped out by long-term broad spectrum antibiotic use.

Spinach really is an outlier. Even though there's small amounts of oxalates found throughout the food supply, spinach alone may account for 40% of oxalate intake in the United States. The Harvard cohorts found that men and older women who ate spinach eight or more times a month had about a 30% higher risk of developing kidney stones.

What if you cook it? Oxalates are water soluble, so, for example, blanching collard greens can reduce oxalate levels by up to 33%. Steaming spinach reduces oxalate levels 30%, and boiling cuts oxalate levels more than half. Boil the three high-oxalate greens, spinach, beet greens, and Swiss chard, and 60% of the oxalates are leached into the cooking water. They start out so high, though, even cooked would contain hundreds times more than low-oxalate greens like kale. For high-oxalate greens, it doesn't matter cooked or not, since they're so high regardless.

The bottom line is that anyone with a history of kidney stones, otherwise at high risk, or who eats cups a day should probably avoid the big three. This is especially important for those who juice or blend their greens, as oxalates appear to be absorbed more rapidly in liquid than solid form.

Another reason to give preference to low-oxalate greens is that they are less stingy with their calcium. While less than a third of the calcium in milks may be bioavailable (whether from a cow or a plant), most of the calcium in low-oxalate vegetables is absorbed. The calcium bioavailability in some greens is twice that of milk, but the oxalates in spinach, chard, and beet greens bind to the calcium, preventing the absorption.