Oxalates For Humans Version 1.1 9 January 2014

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Do you have a history of kidney stones? If so, there's a good chance you've passed a calcium Oxalate stone or two. It's estimated that up to three-quarters of kidney stones are composed of calcium oxalate; and one way to reduce the risk of a kidney stone recurrence is to eat less foods high in oxalates. Oxalates are found primarily in plant based foods such as vegetables and other "good for you" foods such as tea and nuts. If you eat a healthy diet, chances are you're getting a fair amount of oxalic acid or oxalate already - a situation which could lead to kidney stone formation.

Foods high in oxalate may cause or increase inflammation, pain, and burning, irritate tissues and Mucous membranes, and contribute to the formation of calcium oxalate kidney stones.

When too much oxalate is absorbed into the bloodstream via the gut, it can team up with calcium to form sharp calcium-oxalate crystals. These crystals can then wedge themselves into tissue almost Anywhere in the body, causing damage and/or exacerbating pain and inflammation. Excess oxalate can also lead to oxidative damage and the depletion of glutathione. The latter is essential for metabolizing many toxic environmental chemicals that enter the body.

Here are some high oxalic acid foods you may want to limit in your diet if you've had a kidney stone. !

High oxalic acid foods

Vegetables that are a good source of phytonutrients and antioxidants, but many are also high in oxalates. Some examples of high oxalate vegetables are spinach, rhubarb, Brussels sprouts, broccoli, carrots, collard greens, green peppers, cabbage, beets, kale, eggplant, okra, squash, Swiss chard, parsley, and lettuce. It may be difficult to completely eliminate these foods from your diet; and you may not want to since they're a good source of potassium - a mineral which reduces the risk of kidney stones. Ones you should definitely avoid include rhubarb, parsley, beets, Swiss chard, collard greens, radishes and spinach, since they have the highest oxalate content. Eat the rest in moderation.

High oxalic acid foods

Most berries are high in oxalates, as are red currants, concord grapes, tangerines, figs, and plums.These fruits are best replaced with other fruits that are lower in oxalates. !

High oxalic nuts, grains and seeds

Certain grains such as amaranth, wheat germ, wheat bran, and quinoa are unusually high in oxalates and should be avoided. Peanuts, pecans, almonds, cashews, and peanuts are other foods to stay away from if you have a history of kidney stones. !

Other foods

Other foods to avoid with a history of kidney stones include soy beans, black pepper, poppy seeds, cocoa, beer, tea, and chocolate. It's also best to limit foods that are high in vitamin C, since excess vitamin C can be converted to oxalates once in the body. Meat should be eaten in limited quantities. Because oxalates are found in so many foods, talk to your doctor before going on an oxalate restricted diet. A dietician can help formulate a nutritionally balanced meal plan for you that's low in oxalic acid foods. Also, make it a point to drink plenty of water to help flush out oxalates and furtherreduce the risk of painful kidney stones. !

Too much vitamin C can increase the oxalate levels in your body

Oxalates are naturally occurring substances found in plants, animals, and in humans. In chemical terms, oxalates belong to a group of molecules called organic acids, and are routinely made by plants, animals, and humans. Our bodies always contain oxalates, and our cells routinely convert

other substances into oxalates. For example, vitamin C is one of the substances that our cells routinely convert into oxalates. In addition to the oxalates that are made inside of our body, oxalates can arrive at our body from the outside, from certain foods that contain them. !

How do high oxalate foods cause problems?

Most people are able to safely metabolise and process oxalate out of the gut through the stool.

According to researcher Susan Owens, M.A., Director of the Autism Oxalate Project, a problem occurs when excess oxalate is absorbed through the gut due to intestinal permeability, poor fat digestion, inflammation, or prolonged diarrhoea or constipation. Overuse of antibiotics may also pose a problem since this can reduce or eliminate the oxalate-degrading bacteria in the intestines.

In her overview of the scientific research, Owens says there may be a link between excess oxalate in the body and the following conditions:

Thyroid disease
Vulvodynia
Calcium-oxalate Kidney Stones
Cystic Fibrosis
Sarcoidosis
Asthma
COPD
Autism

Excess oxalate may be one among several factors like genetics and environmental triggers that contribute to these disorders and to other conditions reported by members of the Trying Low Oxalates Yahoo forum, started by Owens.

Drinking lots of water and eating foods like bananas that are high in potassium are supposed to counteract the impacts of eating too many oxalates.

Vegetable	Total oxalic acid mg/100g FW		
Amaranth	1090	Kale	20
Asparagus	130	Lettuce	330
Beans, snap	360	Okra	50
Beet leaves	610	Onion	50
Broccoli	190	Parsley	1700
Brussel sprouts	360	Parsnip	40
Cabbage	100	Pea	50
Celery	190	Pepper	40
Casava	1260	Potato	50
Cauliflower	150	Purslane	1310
Carrot	500	Radish	480
Chicory	210	Rutabaga	30
Chives	1480	Spinach	970
Collards	450	Squash	20
Coriander		Potato, sweet	240
Corn, sweet	10	Tomato	50
Cucumber	20	Turnip	210
Egg plant	190	Watercress	310
Endive	110		

The bottom line?

Because oxalates are found in so many foods, talk to your doctor before going on an oxalate Restricted diet. A dietician can help formulate a nutritionally balanced meal plan for you that's low in oxalic acid foods. Also, make it a point to drink plenty of water to help flush out oxalates and further reduce the risk of painful kidney stones.

The leaves of rhubarb contain high concentrations of oxalic acid. The gritty feeling one gets in the mouth when drinking milk with rhubarb desserts is caused by precipitation of calcium oxalate. Luckily, rhubarb is not usually consumed in large enough quantities to cause toxicity, although its regular consumption will contribute to the development of kidney stones in vulnerable persons. Leaves of the tea plant (Camellia sinensis), are also known to contain among the highest levels of oxalic acid relative to other plants. However, hot tea typically contains low amounts of oxalic acid per serving, due to the small amount of leaves used to brew each cup.

Oxalates and health

Conditions that require strict oxalate restriction:

There are a few, relatively rare health conditions that require strict oxalate restriction. These conditions include absorptive hypercalciuria type II, enteric hyperoxaluria, and primary hyperoxaluria. Dietary oxalates are usually restricted to 50 milligrams per day under these circumstances. (Please note: these relatively rare health conditions are different from a more common condition, called nephrolithiasis, in which kidney stones are formed, 80% from calcium and

oxalate). What does 50 milligrams of oxalate look like in terms of food? One cup of raw spinach in leaf form (not chopped) weighs about one ounce, and contains about 200 milligrams of oxalate, so 50

Milligrams for the day would permit a person to consume only 1/4 cup of raw spinach (and no other oxalate sources could be eaten during the day). !

Raw vegetables

Oxalate content milligrams per 100 gram serving:

Spinach	750
Beet greens	610
Okra	146
Parsley	100
Leeks	89
Collard greens	74

The effect of cooking on oxalates

Cooking has a relatively small impact on the oxalate content of foods. Repeated food chemistry

Studies have shown no statistically significant lowering of oxalate content following the blanching or boiling of green leafy vegetables. A lowering of oxalate content by about 5-15% is the most you should expect when cooking a high-oxalate food. It does not make sense to overcook oxalate containing foods in order to reduce their oxalate content. Because many vitamins and minerals are lost from overcooking more quickly than are oxalates, the overcooking of foods (particularly vegetables) will simply result in a far less nutritious diet that is minimally lower in oxalates.

Practical tips

For the vast majority of individuals who have not experienced the specific problems described above, oxalate-containing foods should not be a health concern. Under most circumstances, high oxalate foods like spinach can be eaten raw or cooked and incorporated into a weekly or daily meal plan as both baby spinach and mature, large leaf spinach can both make healthy additions to most meal plans. In short, the decision about raw versus cooked or baby versus mature leaf spinach or other oxalate-containing vegetables, for example, should be a matter of personal taste and preference for most individuals.

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