

Oxalates

Fruit and vegetables are good for us; we all know this. And generally, the more we eat, the better our health. Longer-lived races typically eat over ten a day, whereas most of us in the UK can't manage five a day. Good data show that eating more fruit and vegetables reduce our risk of the three major killers: cancer and heart disease and stroke.

So, what could possibly go wrong? Well, there is risk, it is a largely unknown and for some people it can be serious.

Sadly, this is more likely to happen to those people who are doing their very best to be healthy. That's why you need to know about this.

The problem is that plants protect themselves against insects by producing toxic substances such as phytates, tannins and oxalates. And these can affect us too.

Oxalates are the major concern and we have known about their toxicity for 200 years. Oxalates can be found in fruit, vegetables, seeds, nuts and grains, but in much greater quantities in some than others.

It is surprisingly easy to overload with oxalates on a healthy diet. And a further concern is that few doctors or nutritional practitioners are aware of this risk.

The good news is that it's fairly easy to correct, by replacing high oxalate foods with low oxalate varieties.

Dangers of Oxalates

So, what are the dangers of oxalates? Chicks fed on beet greens die within weeks. Sheep grazing on beet greens have become ill and have sometimes died. Horses foraging on a high-oxalate diet have been observed to become lame with swollen heads: this is known as **big head disease**. In humans, there have been fatalities from very high doses of oxalate, usually by eating sorrell but also from poisoning with ethylene glycol (anti-freeze) which breaks down into oxalates.

Symptoms of Oxalate Toxicity

Confusingly, the range of symptoms from oxalate overload is vast. The symptoms that stand out are those affecting the **urinary and gastrointestinal systems**, such as kidney stones, recurrent infections, interstitial cystitis, cloudy urine, incontinence, abdominal pain, bowel changes, frequent micturition, burning in the genitals, including a condition called **vulvodynia** (chronic pain in the vulva) and chronic kidney disease.

However, there are any many other symptoms including fatigue, burning mouth, bone and muscle pain, migraines, joint swelling, pseudo-gout (due to oxalate crystals), increased fractures, tendinitis, pain, stiffness and knotty muscles, brain fog and vasospasm like Raynaud's syndrome.

Oxalates can also cause neurological symptoms such as facial palsy, vertigo, hearing loss, tingling and tinnitus but also anxiety and depression. The skin can be involved with white and red spots and sores appearing and peeling of skin in the feet and fingers. Tiny crystals, like sand, can be excreted from the skin and eyes.

Oxalates are known to be high in autism and low oxalate diets have been found to help.

They can also activate mast cells triggering the release of histamine and other chemicals which can mimic allergies and cause various pain syndromes.

Oxalates can bind with calcium and magnesium in the gut causing tremors, palpitations, and muscle twitching.

Obviously, there's a lot of symptoms here and these overlap with many other illnesses. But **consider oxalate toxicity if you are getting several of these symptoms, despite what seems like a healthy diet.**

How Much is Too Much

To understand how we can run into problems with oxalates, let's look at what is a dangerous level. Ideally, we need to keep our oxalate levels to below 250 mg daily. This is a high level. Above 600mg is very high. A low oxalate diet would be below 60mg per day. A meal containing more than 70 mg oxalate would be high and below 25mg would be low.

But see below how easy it is to reach these high levels on a normal diet. And when you start adding in juices and smoothies the amount can sky-rocket.

What are the worst offenders: the highest oxalate foods. I will mark very high oxalate foods in red and give grams of oxalate for a typical serving.

Very high oxalate vegetables are **spinach** (300 mg per cup raw, and 450 mg per ½ cup boiled), **beet greens** (380 mg per cup) and **beetroots** (150 mg per cup). Potatoes are high (85 mg for a medium-sized potato) with **sweet potatoes** very high (120 mg per ½ cup). Beans are nearly all high in oxalate (80-140 mg per cup). Fruits with high oxalate content include **blackberries** (60 mg per 4 oz), raspberries, figs and kiwi. Tomato sauce is high. **Rhubarb** is one of the highest of all (370 mg per ½ cup).

Chocolate makes a significant contribution, the **darker the chocolate the higher the oxalate** (110-140 mg per 50 mg) is a cup of cocoa weighs in at 45-80mg. A single piece of Lindt dark chocolate contains 30mg oxalate. Nuts, especially **almonds** (120 mg per 24 nuts), **cashew** (75 mg per 24 nuts) and pine nuts have high levels; many seeds also have high levels (lower in sunflower). Some spices, especially turmeric and cinnamon, are very high but usually the quantity eaten are small. Tea makes an important contribution (20 mg per cup) because of the amount we drink daily.

Grains are a major part of many people's diets. All have moderately high oxalate content. The healthier wholewheat have more oxalate (15 mg per slice of bread) as do seeded breads. Artisan bread can have twice the oxalate content. **Buckwheat** is very high (230 mg per cup) and **quinoa** is also high (110 mg per cup).

Breakfast can be a high oxalate meal. All-bran has 150 mg per cup and shredded wheat 80 mg in two biscuits. Many cereals and mueslis are high in oxalates. Oats tend to be lower.

Generally, boiled vegetables have higher oxalate than raw (except carrots where the reverse is true). Juices and smoothies can be very high in oxalate. **A green smoothie with 2 cups of spinach could contain 1500mg oxalate, a potentially lethal dose.** Nut milks, like almond and soya milk are another source of oxalates (almond milk 15-35 mg per cup - treble this if home-made- and soya milk 20mg per cup).

Increasing the Risk

Some conditions can make a person more vulnerable, especially gut disorders which lead to a leaky gut and hence higher oxalate absorption. Non-steroidal anti-inflammatory drugs like ibuprofen can do the same. Excess fungi in the gut can excrete oxalate, increasing oxalate levels, and may need treatment. Probiotics may help.

There has been some concern about Vitamin C adding to oxalate levels but the conversion of Vitamin C to oxalates is saturated at low levels, so no more oxalate is formed unless very high levels are used.

Testing

Unfortunately, there are no accurate tests for oxalate in the urine or blood. This is partly because of the variable excretion of oxalates and the difficulty in measuring them. The Organic Acid test (by Great Plain Laboratories) shows some promise but this is a private test, not available on the NHS.

Treatment

Recovering from oxalate toxicity is primarily a process of switching to low oxalate foods. This should be done slowly, as a sudden lowering can trigger symptoms. Other measures to deal with toxicity, such as saunas, may help (see toxicity leaflet). Vitamin B6 helps the enzymes that degrade oxalate. Magnesium and calcium can reduce oxalate absorption in the gut. Chondroitin sulphate help to prevent crystals of oxalate forming.

Sally Norton's website and book "Toxic Superfoods" is an excellent resource.