



Nutrition and Kidney Stone Disease

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Nephrolithiasis, the presence of kidney stones

Frequent occurrences between the ages of 30 and 50

Risk factors:

- (Obese individuals have higher urinary excretion of sodium, calcium, oxalate, and uric acid, and their urine has a lower PH)
- Physical activity
- Family history
- Genetic disorders: gout, hyperparathyroidism, renal tubular acidosis, cystinuria, and hyper calciuria
- Gastric bypass
- Chronic diarrhea
- Most important risk factor: decreased urine volume



Diet therapy:

- **Energy:** Similar to that of healthy individuals
- **Protein:** Based on the patient's GFR
- Stone only, without kidney damage: 15%
- Stone + kidney damage + normal creatinine: 1 g (similar to CKD stages 1 and 2)
- Stone + kidney damage + elevated creatinine: 0.6-0.8 g (similar to CKD stages 3 to 5)
- **Fat:** 30-35%
- **Carbohydrate:** Remaining energy

Nutritional Management of Different Types of Stones

When the type of stone is unknown:

- The most important recommendation for all types of stones: drink 8-12 glasses of water
- Alkalinizing urine pH for all stones except struvite stones
- Limiting sodium intake
- Regular physical activity
- Achieving a normal weight

Calcium Oxalate Stones

Recommendation to consume plenty of fluids (10-12 glasses)

Calcium??

Limit oxalate intake??

Limit sodium intake: sodium intake should be below 2,300 mg


Limit animal protein

Limit fructose

Tea?



Calcium stone

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- Hyperoxaluria (>40 mg of oxalate in urine per day) plays an important role in calcium stone formation
 - Patients with inflammatory bowel diseases or gastric bypass often develop hyperoxaluria because of fat malabsorption
 - The bile acids produced during the digestive process normally are reabsorbed in the proximal GI tract, but when this fails to occur, The unabsorbed fatty acids also bind calcium to form soaps, decreasing availability of calcium in a soluble form

- Dietary advice for reducing urinary oxalate should include reduction of dietary oxalate and simultaneous consumption of calcium-rich food to reduce oxalate absorption





Classification of Foods by Oxalate Content:

Very high oxalate content: 99 mg per serving: Bran, almonds, sesame seeds, beets, rhubarb, soy milk, Cocoa products

High Oxalate: 99-26 mg per serving: Hazelnuts, peanuts, soybeans, dried apricots, dried figs, kiwi, strawberries, cooked okra, fried potatoes, tomato sauce, white beans, cooked soybeans, soy milk, chocolate ice cream, cocoa powder

Moderate Oxalate: 26-10 mg per serving: Walnuts, pistachios, blackberries, mulberries, mango, oranges, prunes, cooked green beans, carrots, celery, zucchini, baked potatoes, tomatoes, chocolate milk, hot chocolate, tea, black pepper, and curry



Calcium Oxalate Stones

Citrate Intake: Consume fruits rich in citrate, such as cantaloupe, honeydew, tomatoes, lemons, oranges, and other citrus fruits: Citrate helps prevent the formation of calcium oxalate crystals.

Potassium and Magnesium Intake: Follow a DASH diet rich in potassium and magnesium.

Vitamin C: Up to 90 mg daily is not problematic.

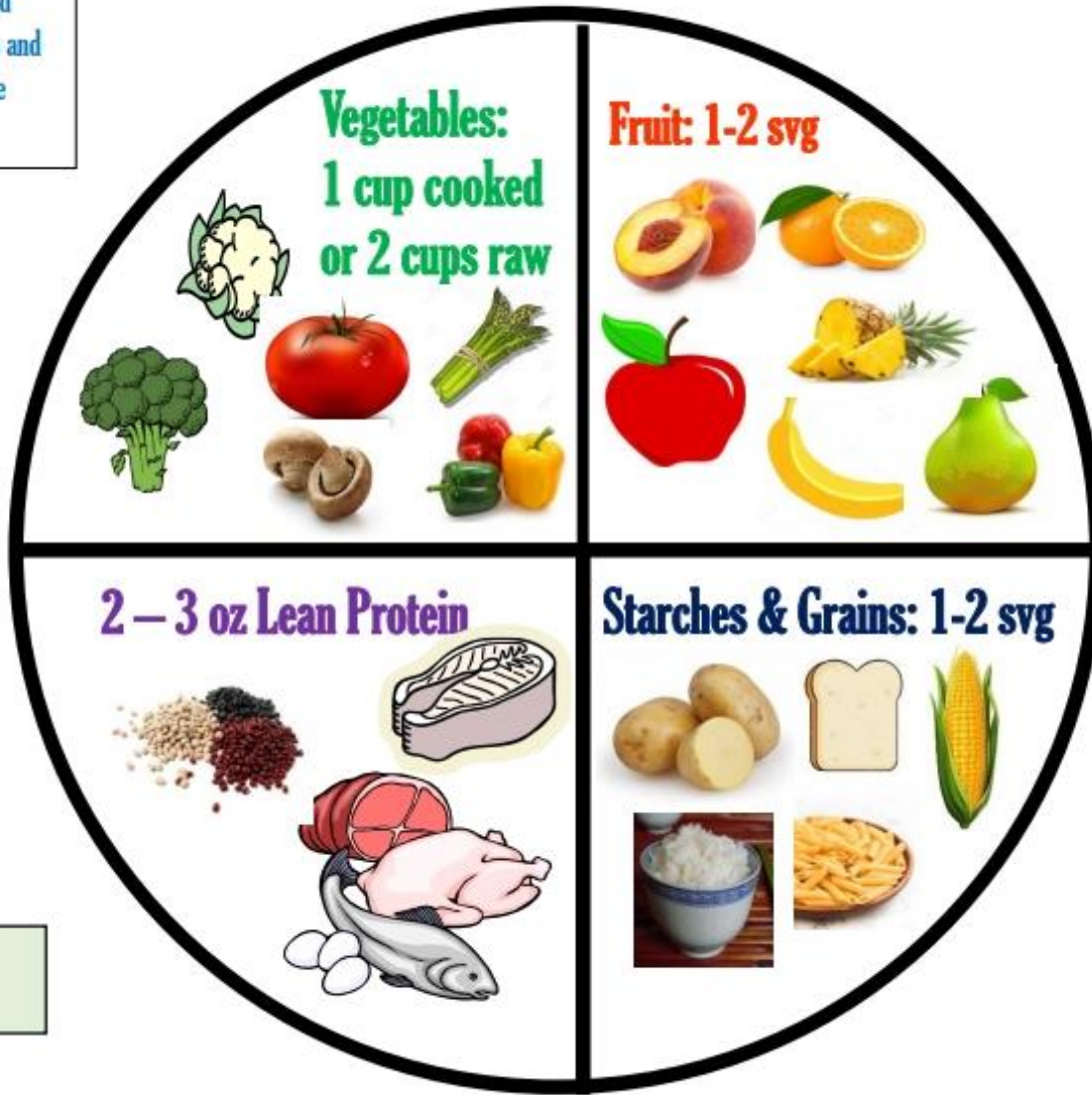
Vitamin B6: Recommended dose is 40 mg along with magnesium.

Fitness: Maintain a normal BMI range.

Increase Physical Activity: Engage in regular physical activity.

Lunch & Dinner

Your diet plan will be customized based on your urine, blood tests and medical conditions when you are followed by a nutritionist



Vegetables:
1 cup cooked
or 2 cups raw



Fruit: 1-2 sgv



2 – 3 oz Lean Protein



Starches & Grains: 1-2 sgv



Total fluid intake : 3L
(quarts)/day



1 serving with each meal
3x/day

Plan Your Plate For Kidney Stones (Calcium Oxalate)




Probiotics:

Small studies have demonstrated an association between certain gut bacteria and urinary citrate and oxalate. However, manipulation of the microbiome with probiotics to promote bacteria with favorable associations has yet to be proven clinically effective

A type of bacteria called **Oxalobacter formigenes** is present in the natural gut flora and breaks down oxalate. The levels of this bacterium are lower in individuals with a history of kidney stones. Supplementing with this probiotic reduces the recurrence of oxalate stones.

Lactobacillus acidophilus is a probiotic that inhibits oxalate absorption



Omega-3 supplements at a dose of 1200 mg/day can reduce urinary excretion of calcium and oxalate. Weight loss medications that inhibit fat absorption (such as Orlistat) can increase oxalate absorption from the intestine, raising the likelihood of kidney stone formation.

Uric Acid Stones:

- Weight loss
- Distribution of carbohydrates
- Water intake (3 liters per day)
- Alkalinizing urine
- Sodium restriction
- Low-purine diet
- Limiting fructose-sweetened beverages
- Limiting acidic foods



Uric acid stone



Classification of Purine Foods:

Foods Rich in Purines: 100-1000 mg per 100 grams of food:

Broth, meat extract, heart, liver, kidney, brain, sardines, anchovies, mackerel, shellfish, goose, quail, yeast.

Foods with Moderate Purine Content: 9-100 mg per 100 grams of food: Poultry, meats, fish, beans, lentils, mushrooms, yeast, asparagus, spinach, peas, cauliflower.

Foods with Negligible Purine Content: White bread, milk, cheese, chocolate, eggs, fruits, nuts, olives, salt, sugar, tea, coffee, corn.



Potentially Acidic Foods

- Protein: meat, fish, shellfish, eggs, all types of cheese, peanut butter, peanuts
- Fat: walnuts, pumpkin seeds, sesame seeds, sunflower seeds, creamy salad dressings
- Carbohydrate: all types of bread including corn bran, oats, macaroni, rice bran, wheat and especially wheat gluten
- Sweets: gelatin desserts (dry mix with and without aspartame), pudding



Potentially Basic or Alkaline Foods

- ❑ Fat: dried chestnuts, acorn
- ❑ Vegetables: all types
- ❑ Fruit: all types
- ❑ Spices/Herbs: all types, especially fresh dill weed and dried spices/herbs such as basil, coriander, curry powder
- ❑ Sweets: sugar (brown), molasses, cocoa (dry powder)
- ❑ Beverages: coffee



Neutral Foods

- Fats: butter, margarine, oils
- Dairy: milk
- Vegetables: corn
- Sweets: sugar (white), honey
- Beverages: water, tea

Struvite Stones:

Caused by infection

2 to 1 ratio in women

Composed of magnesium, ammonium, phosphate, and carbonate apatite

Recommendation to acidify urine pH

Consume prune and cranberry juice



Struvite stone

Cystine Stones:

Recommendation to consume 4 liters of fluids

Limit sodium intake

Alkalinize the urine

Limit methionine-rich foods (milk, meat, and eggs)

Citrate intake

Increase fiber intake

A diet rich in fruits and vegetables, including citrate sources such as cantaloupe, honeydew, and tomatoes, is recommended



Cystine stone

Calcium Phosphate Stones:

Form during the second and third trimesters of pregnancy.

Dietary phosphorus is not highly significant.

The most important factor for those prone to this type of stone is urine PH. This stone forms in alkaline pH, so to prevent its formation, urine should be acidified as much as possible.



References:

Krause and Mahan's Food and the Nutrition Care Process, 16th Edition 2024

Dietary weight loss strategies for kidney stone patients

R [Siener](#), C Metzner - World Journal of Urology, 2023

Popular Diets and Kidney Stones

S Zayed, [DS Goldfarb](#), [S Joshi](#) - Advances in Kidney Disease and Health, 2023

Medical management of kidney stones: a review

J Felizio, [W Atmoko](#) - Bali Medical Journal, 2022

Diet interventions for calcium kidney Stone Disease

S Sharif, MD Jie Tang, MR Lynch - Rhode Island Medical Journal, 2023



Thank you for your
attention!
