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## Diet in Urolithiasis



Urolithiasis (urinary stone disease) is a common disorder with a life time recurrence rate as high as 40- 80 %. Similar to many other disease processes Urolithiasis is influenced by a number of genetic and environmental factors. These factors are grouped in to modifiable and unmodifiable. Diet is a major modifiable environmental component which is frequently ignored in the management of individuals with this disorder.

Urine is a complex chemical solution containing substances which form part of the stone, substances which facilitates stone formation as well as substances which inhibit stone formation. By dietary modification and other measures, we are trying to alter this chemical balance to get an upper hand in favour of stone inhibiting factors. Supersaturation of urine with stone forming chemicals is a prerequisite for stone formation. Adequate hydration results in urine which is less saturated and benefits all stone formers. Increasing the fluid consumption alone can decrease the rate of stone formation by as much as 60 %. It is currently recommended that patients consume enough fluids (at least 10-oz glasses per day) to produce a 24 hour urine volume of 2-3 L per day. Additional fluid may be required in the summer months or with strenuous exercise (especially for those working in the fields) when insensible water loss from sweating is increased. The fluid intake should be balanced throughout the day so as to achieve a constantly high urine output. After the meals and at night, urine tends to be supersaturated and hence an adequate urine flow at this time is highly preferred.

Studies have demonstrated an association between high animal protein diet and an increased incidence of stone disease. A vegetarian diet devoid of animal protein has been associated with a lower risk of urolithiasis. It is probably prudent for stone patients to have limited servings of meat products - should not exceed a maximum of 8 oz per day depending on the BMI.

A high salt (sodium) diet increases urinary calcium and phosphate facilitates uric acid crystal formation and decreases urinary citrate and thus contributes to increased stone formation. Hence salt restriction is recommended for recurrent stone formers, but they should avoid shakers, pickles, other salty foods and avoid additional salt sprinkling during meals.

Traditionally oral calcium restrictions has been the main dietary recommendation for prevention of calcium stones.. Only patients with absorptive hypercalciuria type 2 (i.e.-dietary dependent) benefit from low calcium diet and they constitute only a small fraction of patients. Indiscriminate calcium restriction should be avoided. Milk and milk products can be consumed and should not exceed 500 ml per -day. Those patients on calcium supplements should take it along with meals and never on empty stomach. Main dietary sources of calcium are dairy products, meat and green leafy vegetables.

Majority of urinary stones contain oxalate and it seems logical to restrict dietary oxalate to lessen the stone risk. Dietary oxalate contributes to 10- 20 % (more recent studies suggest up to 80 %) of urinary oxalate and the rest comes from body metabolism. Reduction in dietary oxalate is a standard recommendation to individuals with calcium oxalate stone disease. Diets rich in oxalate are spinach, rhubarb, beetroot, beet green, cocoa, chocolates, coffee and tea, nuts (pea nut, almond, cashew), asparagus, cumin seed, cranberry,

raspberry, dried beans, bran flakes, wheat bran, strawberries. Other high-oxalate foods are grits, bran cereals, berries, figs, citrus peels, kiwis, tangerines, green leafy vegetables, okra, olives, beans, parsley, zucchini, potatoes and sweet potatoes, peppers, eggplant, black pepper, marmalade and soy sauce. Beverages with oxalate include coffee, chocolate milk and hot chocolate, dark beers, black tea, soy drinks and juices made out of high-oxalate fruits.

In patients with uric acid related stones and gout, purine restriction is recommended. Such patients should reduce animal protein considerably. Avoid red meats such as liver, brains, kidneys and offal meat in all forms. Tinned fish, salted fish, sardines, shrimps, oysters, mussels, herring, anchovies, mushrooms, yeast products and cauliflower are other food items rich in uric acid. Regular consumption of the above mentioned items are preferably avoided and have only occasional servings. These patients can consume fruits, cereals, toast, buttermilk, ice creams, cake, egg, vegetable soups, potato and other allowed vegetables.

Citrate is a naturally occurring urinary stone inhibitor. Citrus fruits are found to increase urinary citrate and hence preferred over grapes and apple in stone formers. Potassium rich products are preferred since they increase urinary citrate.

Dietary fibre consumption has been found to decrease the urinary oxalate and increases the urinary citrate..

Vitamin B6 is found to have protective role in stone prevention.

Phosphate modifications are employed in certain types of stones. High phosphate diet is recommended for calcium oxalate related stones and a low phosphate intake for magnesium ammonium phosphate stones. Milk (up to 500 ml, cheese, fish, egg and whole grain are some of the foods which can be safely recommended for stone patients.

These modifications are genuinely recommended for recurrent stone formers and should be continued on a long term basis. Specific dietary recommendations for individual patient can be made only after a proper metabolic evaluation and stone analysis.

Fluid therapy is safe, cheap and effective and it should be the front line approach for all stone formers.