USANA Technical Bulletin

Kidney Stones

Description

- A kidney stone is a calculus or a crystalline mass that has formed in the pelvis of the kidney. Kidney stones are composed principally of urates, oxalates, phosphates, and carbonates, and can be up to an inch or more in diameter.[1]

Causes

- Dehydration may lead to more concentrated urine and the inability to remove all calculus forming substances.
- Infection may lead to a build up of calculi. Bacteria or scar tissue may serve as the nucleus of the kidney stone.[2]
- Acidic (low pH) urine may provide an environment conducive to kidney stone formation.
- At one time it was believed that dietary calcium might cause kidney stones.[2] However, more recent studies indicate that dietary calcium actually decreases kidney stone formation.[3]

Types

- Kidney stones are categorized by the minerals that they contain.

At Risk

- People who live in the southeastern United States are at higher risk. The reasons for this increased geographic risk are not entirely understood, but dehydration due to the higher temperatures may play a role, and regional dietary preferences may also contribute.[2]
- Those who get kidney stones once are at a high risk of recurrence.

Prevention and Management

- Increasing dietary calcium may help reduce the occurrence of kidney stones.
- Magnesium may reduce the incidence of kidney stones by improving the ratio of calcium to magnesium.[4]
- Vitamin B_6 may reduce the incidence of oxalate containing kidney stones.[6]
- Increased consumption of fluids, particularly water, reduces the risk of stone formation.

- Reducing intake of meat protein may also help.[4]
- There continues to be a debate about whether or not patients prone to kidney stones should take more than 2,000 mg of vitamin C a day. A study published in 1996 concluded that there was no correlation between taking large amounts of vitamin C and the occurrence of kidney stones.[5]

Sources of Additional Information

- http://pulsar.cs.wku.edu/~travibr/kidney.html

Abstracts

Curhan GC, Willett WC, Rimm EB, Stampfer MJ. A prospective study of the intake of vitamins C and B6, and the risk of kidney stones in men. J Urol 1996 Jun;155(6):1847-51. PURPOSE: The association between the intake of vitamins C and B6, and kidney stone formation was examined. MATERIALS AND METHODS: We conducted a prospective study of the relationship between the intake of vitamins C and B6 and the risk of symptomatic kidney stones in a cohort of 45,251 men 40 to 75 years old with no history of kidney calculi. Vitamin intake from foods and supplements was assessed using a semiquantitative food frequency questionnaire completed in 1986. RESULTS: During 6 years of followup 751 incident cases of kidney stones were documented. Neither vitamin C nor vitamin B6 intake was significantly associated with the risk of stone formation. For vitamin C the age-adjusted relative risk for men consuming 1,500 mg. daily or more compared to less than 250 mg. daily was 0.78 (95% confidence interval 0.54 to 1.11). For vitamin B6 the age-adjusted relative risk for men consuming 40 mg. daily or more compared to less than 3 mg. daily was 0.91 (95% confidence interval 0.64 to 1.31). After adjusting for other potential stone risk factors the relative risks did not change significantly. CONCLUSIONS: These data do not support an association between a high daily intake of vitamin C or vitamin B6 and the risk of stone formation, even when consumed in large doses.

Soucie JM, Coates RJ, McClellan W, Austin H, Thun M. Relation between geographic variability in kidney stones prevalence and risk factors for stones. Am J Epidemiol 1996 Mar 1;143(5):487-95. To determine whether geographic variability in rates of kidney stones in the United States was attributable to differences in personal and environmental exposures, the authors examined cross-sectional data that included information on self-reported, physician-diagnosed kidney stones collected from 1,167,009 men and women, aged > or = 30 years, recruited nationally in 1982. Information on risk factors for stones including age, race, education, body mass, hypertension, and diuretic and vitamin C supplement use was obtained by self administered questionnaire. Consumption of milk, coffee, tea, soft drinks, and alcohol was based on food frequency data. Indices of ambient temperature and sunlight level were assigned to subjects based on state of residence. Stones were nearly twice as prevalent in the Southeast as in the Northwest among men and women. Ambient temperature and sunlight indices were independently associated with stones prevalence after controlling for other risk factors for stones. Regional variation was eliminated for men and greatly reduced for women after adjustment for temperature, sunlight, and beverage consumption. Other factors appeared to not contribute to regional variation. These results provide evidence that ambient temperature and sunlight levels are important risk factors for stones and that differences in exposure to temperature and sunlight and beverages may contribute to geographic variability.

Jaeger P. Prevention of recurrent calcium stones: diet versus drugs. Miner Electrolyte Metab 1994;20(6):410-3. Excessive intakes of meat protein, oxalate and potentially sodium, as well as insufficient intakes of vegetables fibers, calcium and fluid all lead to increased urinary crystallization. Renal stone disease, however, does not have to ensue. The underlying condition in a given patient is of paramount importance to allow 'bad eating habits' to lead to nephrolithiasis. Several of these underlying

abnormalities have been detected so far from which we recently derived the powder keg and tinderbox theory. Most of the time, the dietary approach to nephrolithiasis allows recurrence of renal stone formation to be prevented. The pharmacological approach should be reserved for refractory cases.

References

[1] Taber's Cyclopedic Medical Dictionary. 16th ed. Philadelphia:F.A. Davis Company; 1985. p 975.
[2] Diseases. Springhouse (PA):Springhouse Publishing; 1993. p 813.
[3] Jaeger P. Prevention of recurrent calcium stones: diet versus drugs. Miner Electrolyte Metab 1994;20(6):410-3.
[4] Somer, E. The Essential Guide to Vitamins and Minerals. New York:Harper Perennial; 1992. p 204.
[5] Curhan GC, Willett WC, Rimm EB, Stampfer MJ. A prospective study of the intake of vitamins C and B6, and the risk of kidney stones in men. J Urol 1996 Jun;155(6):1847-51.