



See original article by Akel et al on pages 39-41



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Administration of calcium and vitamin D supplementation in kidney stone formers

Tayebeh Soleymanian*

Nephrolithiasis is a common medical issue worldwide and it has an overall prevalence of 7% in women and 10.5% in men (1). It mainly affects active working age population and has high socio-economic burden (2). Calcium comprises about 80%-90% of the kidney stones components as calcium oxalate and calcium phosphate, so that applying measures for reducing urine calcium excretion have increasingly been used (3). Calcium is absorbed by both active calcitriol-dependent and passive mechanisms in small bowel depending on the amount of daily consumption, and it ranges between 10% to 70% (4,5). It has been shown that kidney stone formers have higher fractional absorption of calcium in intestine leading to greater urinary calcium excretion (6,7). Multiple large studies have shown that calcium intake has a protective role against kidney stone formation by decreasing absorption of intestinal oxalate and subsequent decline in urine oxalate (8-10). Furthermore, Restriction of calcium intake not only would raise risk of oxalate absorption, it also has detrimental effect on bone mineral density which has already been lost in kidney stone formers (11). Therefore, moderate calcium intake of 800-1200 mg daily, mainly by calcium-rich diet or as supplementation taking with diet, is advocated for stone formers (12). It has been demonstrated that intake of calcium supplements both with and without meal increases urine calcium, but because of binding of dietary oxalate with calcium when it is taken with meal, the amount of intestinal oxalate absorption and its urine secretion declines and the rate of stone formation would not increase (13). Of note, apart from calcium intake in high amounts, several other dietary habits including low fluid intake, small intake of fruits and vegetable, large sodium intake, excessive consumption of diet rich in oxalate, and high meat intake are involved in stone formation (14). Therefore, patients who are taking calcium and vitamin D supplements should be advised to consider the foregoing predisposing factors of stone formation. Also, as several systemic diseases such as diabetes, obesity and hypertension are linked with stone disease (15,16), approaches for managing these conditions

■ Implication for health policy/practice/research/medical education

Taking recommended doses of supplemental calcium and vitamin D among nephrolithiasis patients have no significant consequence on kidney stone formation.

■ **Keywords:** Vitamin D, Kidney stone, Dietary oxalate

would become relevant.

In two studies, one in postmenopausal women (Women's Health Initiative, WHI) and the other in a groups of older nurses (Nurses' Health Study I, NHS I), which evaluated the consequences of taking supplemental calcium± vitamin D on stone formation, the risk of forming stone was respectively increased 17% and 20% (17,18). Nevertheless, other studies failed to determine an increased risk of stone formation with calcium supplements (8,19). In NHS I study, more than sixty percent of women had taken calcium supplements separate from meals or with a low oxalate breakfast. Of note, urine of active stone former patients who consume calcium± vitamin D should regularly be assessed for hypercalciuria and then dosage and type of supplementation should be adjusted.

There is a large body of evidence regarding the association between vitamin D deficiency and wide spectrum of diseases such as cardiovascular disease and diabetes (20,21). Additionally, Low bone density and vitamin D insufficiency are common in stone formers and they usually need to take vitamin D. It has been presented that serum 25-OH vitamin D level of 20-100 µg/dl has no significant effect on stone formation (22). Conversion of 25-OH vitamin D to 1,25 (OH)₂ vitamin D, which is involved in active intestinal calcium absorption, is tightly regulated by 1-α hydroxylase enzyme and therefore in nontoxic use of vitamin D the likelihood of hypercalciuria is minimal (23). Only WHI study (17) has demonstrated a small increase risk of kidney stones in patients receiving vitamin D together with calcium while studies of male healthcare professionals (Health Professionals Follow Up Study, HPFS) (8) and younger nurses (Nurse's Health Study

Received: 4 November 2017, Accepted: 8 January 2018, ePublished: 12 January 2018

Division of Nephrology, Department of Nephrology, Shariati Hospital, Tehran University of Medical Sciences, Tehran, Iran.

*Corresponding author: Tayebbeh Soleymanian, Email: soleymanian@tums.ac.ir

II, NHS II) (19) did not report such a risk with taking usual doses of supplements. Thus, as reported by Akel et al and colleagues in this issue of *Journal of Parathyroid Disease*, taking recommended doses of supplemental calcium and vitamin D among nephrolithiasis patients have no significant consequence on kidney stone formation (24).

Author's contribution

TS is the single author of the paper.

Conflicts of interest

The author declares that she has no conflict of interests.

Ethical considerations

Ethical issues (including plagiarism, data fabrication, double publication) have been completely observed by the author.

Funding/Support

None.

References

1. Scales CD Jr, Smith AC, Hanley JM; Project UDiA. Prevalence of kidney stones in the United States. *Eur Urol*. 2012; 62:160-5.
2. Saigal CS, Joyce G, Timilsina AR; Urologic Diseases in America Project. Direct and indirect costs of nephrolithiasis in an employed population: opportunity for disease management? *Kidney Int*. 2005;68:1808-14.
3. Pearle MS, Roehrborn CG, Pak CY. Meta-analysis of randomized trials for medical prevention of calcium oxalate nephrolithiasis. *J Endourol*. 1999;13:679-85.
4. Heaney RP, Saville PD, Recker RR. Calcium absorption as a function of calcium intake. *J Lab Clin Med* 1975; 85:881-90.
5. Bronner F, Pansu D. Nutritional aspects of calcium absorption. *J Nutr*. 1999;129:9-12.
6. Pak CY, East DA, Sanzenbacher LJ, Delea CS, Bartter FC. Gastrointestinal calcium absorption in nephrolithiasis. *J Clin Endocrinol Metab*. 1972;35:261-70.
7. Worcester EM, Coe FL. New insights into the pathogenesis of idiopathic hypercalciuria. *Semin Nephrol*. 2008;28:120-32.
8. Curhan GC, Willett WC, Rimm EB, Stampfer MJ. A prospective study of dietary calcium and other nutrients and the risk of symptomatic kidney stones. *N Engl J Med*. 1993;328:833-8.
9. Hess B, Jost C, Zipperle L, Takkinen R, Jaeger P. High-calcium intake abolishes hyperoxaluria and reduces urinary crystallization during a 20-fold normal oxalate load in humans. *Nephrol Dial Transplant*. 1998;13:2241-7.
10. Taylor EN, Curhan GC. Dietary calcium from dairy and nondairy sources, and risk of symptomatic kidney stones. *J Urol*. 2013;190:1255-9. doi: 10.1016/j.juro.2013.03.074.
11. Jaeger P, Lippuner K, Casez JP, Hess B, Ackermann D, Hug C. Low bone mass in idiopathic renal stone formers: magnitude and significance. *J Bone Miner Res*. 1994;9:1525-32.
12. Sorensen MD. Calcium intake and urinary stone disease. *Transl Androl Urol*. 2014;3:235-240. doi: 10.3978/j.issn.2223-4683.2014.06.05.
13. Domrongkitchaiporn S, Sopassathit W, Stitchantrakul W, Prapaipanich S, Ingsathit A, Rajatanavin R. Schedule of taking calcium supplement and the risk of nephrolithiasis. *Kidney Int*. 2004; 65:1835-41.
14. Morgan MSC, Pearle MS. Medical management of renal stones. *BMJ*. 2016; 352:i52. doi: 10.1136/bmj.i52.
15. Taylor EN, Stampfer MJ, Curhan GC. Diabetes mellitus and the risk of nephrolithiasis. *Kidney Int*. 2005;68:1230-5.
16. Borghi L, Meschi T, Guerra A, Briganti A, Schianchi T, Allegri F, Novarini A. Essential arterial hypertension and stone disease. *Kidney Int*. 1999; 55:2397-406.
17. Jackson RD, LaCroix AZ, Gass M, Wallace RB, Robbins J, Lewis CE et al. Calcium plus vitamin D supplementation and the risk of fractures. *N Engl J Med*. 2006;354:669-83.
18. Curhan GC, Willett WC, Speizer FE, Spiegelman D, Stampfer MJ. Comparison of dietary calcium with supplemental calcium and other nutrients as factors affecting the risk for kidney stones in women. *Ann Intern Med*. 1997;126:497-504.
19. Curhan GC, Willett WC, Knight EL, Stampfer MJ. Dietary factors and the risk of incident kidney stones in younger women—Nurses' Health Study II. *Arch Intern Med*. 2004;164:885-91.
20. Welles CC, Whooley MA, Karumanchi SA, Hod T, Thadhani R, Berg AH, et al. Vitamin D deficiency and cardiovascular events in patients with coronary heart disease: data from the Heart and Soul Study. *Am J Epidemiol*. 2014;179:1279-87. doi: 10.1093/aje/kwu059.
21. Pittas AG, Dawson-Hughes B, Li T, Van Dam RM, Willett WC, Manson JE et al. Vitamin D and calcium intake in relation to type 2 diabetes in women. *Diabetes Care*. 2006; 29:650-6.
22. Nguyen S1, Baggerly L, French C, Heaney RP, Gorham ED, Garland CF. 25-Hydroxyvitamin D in the Range of 20 to 100 ng/mL and Incidence of Kidney Stones. *Am J Public Health*. 2014; 104:1783-7. doi: 10.2105/AJPH.2013.301368.
23. Ferraro PM, Taylor EN, Gambaro G, Curhan GC. Vitamin D Intake and the Risk of Incident Kidney Stones. *J Urol*. 2017; 197:405-410. doi: 10.1016/j.juro.2016.08.084.
24. Akel MG, Fahs IM. Calcium and vitamin D supplements administration in patients with nephrolithiasis; an observational prospective study. *J Parathyroid Dis*. 2018;6:39-41. doi: 10.15171/jpd.2018.15.

Please cite this paper as: Soleymanian T. Use of calcium and vitamin D supplementation in kidney stone formers. *J Parathyroid Dis*. 2018;6(2):74-75. doi: 10.15171/jpd.2018.23.

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