Does Dietary Assessment Aid in the Analysis of 24 Hour Urine Collections in the Management of Hypercalciuria?

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Introduction and Objective

INTRODUCTION:
Dietary factors can influence urinary stone risk, yet many urologists are poorly trained in the science of nutrition and are unexperienced in obtaining and quantifying the amount of stone-related nutrients the patient is obtaining in the diet.

This means that often dietary assumptions are made from the 24-hour urine results without the ability to compare these to a dietary assessment. Physicians may therefore make incorrect assumptions regarding the amount of calcium a patient is eating by looking at the 24 hour urine. In addition, they may make blanket statements such as, "reduce your sodium intake" which may not be relevant to that particular patient and is so vague as to be unhelpful.

A further potential concern is the unnecessary dietary calcium restriction which can lead to adverse effects on their bone health and may not be the appropriate recommendation.

OBJECTIVE
We studied the dietary intake of a cohort of patients with a history of stone disease in order to compare the reported diet to the 24-hour urine parameters.

Methods

Dietary questionnaires designed by our group to assess the habitual intake of known stone-related dietary risk factors were distributed to patients in our multi-disciplinary stone clinic and matched with the 24-hour urine results of the same patients between May 2016 and April 2017.

The questionnaire asks the patient to report the types, frequency and relative proportion of different types of food in an effort to allow quantification of stone-related dietary items. All dietary questionnaires were reviewed by a registered dietician and nutrient intake was quantified.

We analyzed our data for those patients with the following findings:
- Hypercalciuria (>250 mg/day)
- High dietary calcium intake (> 1,200 mg/day)
- High dietary sodium intake (> 4,600 mg/day = >200 mEq/day)

We separately analyzed patients who were not taking any stone-related medications (thiazides or potassium citrate as well as any calcium or vitamin D supplements

Results

TABLE 1. Study Results and Subgroup Analyses
Table representing the results of the study. The percentages shown represent vertical columns for each subgroup shown in the left hand column.

Association of Dietary Calcium (Ca) and Sodium (Na) on Urinary (Ur) Calcium											
		All Pts*		UrCa ≥ 250		UrCa < 250		Diet Ca ≥ 1200		Diet Ca < 1200	
Total		62		28	45.2%	34	54.8%	24	38.7%	38	61.3%
Mean Age		53		55		52		53		54	
Gender	M	40	65.5%	24	85.7%	16	47.1%	16	66.7%	24	63.2%
	F	22	34.5%	4	14.3%	18	52.9%	8	33.3%	14	36.8%
Urine Ca	UrCa ≥ 250 mg/d	28	45.2%					10	41.7%	18	47.4%
	UrCa < 250 mg/d	34	54.8%					14	58.3%	20	52.6%
Dietary Ca	dCa > 1200 mg/d	24	38.7%	10	35.7%	14	41.2%				
	dCa < 1200 mg/d	38	61.3%	18	64.3%	20	58.8%				
Dietary Na**	dNa ≥ 4600 mg/d	22	35.5%	10	35.7%	12	35.3%	9	37.5%	13	34.2%
	dNa < 4600 mg/d	40	64.5%	18	64.3%	22	64.7%	15	62.5%	25	56.8%
	Mean UrCa (mg/d)	250		349		167		247		251	
	Mean diet Ca (mg)	1,054		1,053		1,055		1,500		772	
	Mean UrNa (mEq/d)	183		209		162		194		176	
	Mean diet Na (mg)	4,208		4,188		4,223		4,363		4,109	

*No patients listed in Table 1 were taking any stone-related medications and were not taking calcium or vitamin D supplements
**4,600 mg/day of sodium is equivalent to 200 mEq/day

- **62 patients** of the total cohort were not taking thiazides, potassium citrate, calcium supplements or vitamin D supplements
- Mean dietary calcium intake was 1,054 ± 414 mg/day
- Mean urinary calcium excretion was 250 ± 110 mg/day
- **Dietary calcium intake ≥ 1,200 mg/day was identified in 39%**
- Hypercalciuria (≥ 250 mg/day) was observed in 45% of patients
  - Of these, 36% reported consuming > 1,200 mg/day of calcium
- There was no difference in dietary sodium or dietary calcium between patients with high urinary calcium compared with normal urinary calcium (P = 0.92 and 99 respectively).

Discussion

•Our study provides data regarding the paired dietary and urinary data for stone formers at a single institution.

•The mean reported dietary calcium was below the RDA for calcium intake of 1,200 mg/day suggesting that the many of our patients have a suboptimal calcium intake

•While items such as urinary volume and urinary sodium certainly do directly reflect the dietary intake, it is unclear by analyzing the 24-hour urine alone if those dietary practices are isolated events or habitual ones.

•This study allows the urologist to combine 24-hour urine results with habitual dietary intake. This may help to minimize the bias where patients try to eat or drink better just for the test and to gain a better understanding of the habitual dietary practices of the patient.

•Combining this dietary data to the 24-hour urine data may help to better understand the true risk factors of the patients and to tailor improved dietary and medication recommendations.

Conclusions

- **The majority of patients (61%) reported dietary calcium intake below RDA (1,200 mg/day)**
- **Only 36% of the patients with hypercalciuria reported high dietary sodium**
- **Patients with hypercalciuria may benefit from nutrition evaluation to avoid unnecessary or potentially deleterious "blind" dietary recommendations**