

ARE THE PREVALENCE OF NEPHROLITHIASIS AND HIGH SALT INTAKE PREFERENCE ASSOCIATED?

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ABSTRACT:

BACKGROUND: 75% of all renal stones are composed of Calcium salts. Sodium renal excretion augment renal Calcium excretion. In males with recurrent Calcium oxalate stones and Hypercalciuria, restricted intake of animal protein and salt combined with normal Calcium intake provides greater protection than the traditional low Calcium intake; but this is difficult to accomplish because salt intake enhance the taste of food to many people.

AIM OF STUDY: To study any statistically significant correlation between prevalence of nephrolithiasis and high salt intake preference compared to patients having other than nephrolithiasis.

PATIENTS AND METHODS: This is a case controlled, screening retrospective study of 274 patients accomplished abdominal U\S at University Hospital in Al-Diwania city, from 9\15\07-1\15\0for a variety of reasons ;divided into those with +ve Nephrolithiasis (80 patients) and those without Nephrolithiasis (194 patients). All were interviewed by a verbal questioner about preference and consumption of HIS in their usual home made daily meals. Both groups were matched to age and residence.

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RESULTS:

The results showed 54 patients from +ve Nephrolithiasis group prefer and consume HSI, while 26 patients don't ; compared to 8 patients from -ve Nephrolithiasis group prefer and consume HSI, while 187 don't; with P value <0.001. This strong correlation still presents after controlling sex , but not family clustering.

CONCLUSIONS:

Preference and consumption of HSI is strongly correlated to increased risk of Nephrolithiasis, even after controlling male sex but not family clustering.

Key wards: Nephrolithiasis, High salt intake

INTRODUCTION:

Nephrolithiasis refers to stone formation within renal tubule or collecting system, although the calculi are found within the ureter or in the bladder. The principal type of renal calculi are calcium (Ca), urate struvite, and cystine. It presents as renal colic, hematuria, and dysuria.^(1,2)

The annual incidence of Nephrolithiasis is >1\1000 persons, peak age of onset is the third decade of life. The prevalence increases with age until 70 years. Males are more prone to stone formation than females in a ratio of 2-4\1 and more than half have +ve family history of renal stones, suggesting X modified polygenic inheritance pattern.^(1,2)

Dietary calcium restriction is not beneficial and could actually increase the rate of stone formation⁽³⁾. Sodium excretion by renal tubules augments urinary calcium excretion. Hence, dietary salt restriction which diminishes sodium excretion is associated with a decrease in calcium diuresis. If sodium excretion remains high, patients should be encouraged to limit their sodium intake further⁽¹⁾. The added sodium (as sodium bicarbonate) increases sodium urate formation which serves as a nidus for calcium oxalate precipitate at high pH. 75% of all stones are composed of calcium salts, 10% are the results of infection with urease-producing bacteria, composed of struvite; and an additional 10% are composed of uric acid^(1,4). Increase of salt intake promotes a variety of effects, it enhances urinary calcium excretion, increases all kidney stone formation rate, increases urinary pH, and decreases urinary citrate excretion^(2,4,5,6).

Habitual HSI may be an etiological factor in the generation of excessive excretion of

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Calcium, Sodium, and Phosphate in Hypercalciuria syndrome⁽⁵⁾. HSI in healthy adults has been associated with high fractional intestinal calcium absorption, high PTH and Vit D3 levels^(3,7). Sodium and Calcium show common sites of reabsorption in the renal tubules⁽¹⁾.

Dietary Sodium need to be controlled during any Calcium testing to avoid affecting the results^(1,3,5,7). In males with recurrent Calcium oxalate stones and Hypercalciuria, restricted intake of animal protein and salt, compared with normal Calcium intake, provide greater protection than the traditional low Calcium diet^(5,7).

STUDY DESIGN:

It is an epidemiological, cross sectional, case control, screening, retrospective study, involved 274 consecutive patients performing abdominal U\S study in University Hospital in AL_DIWANIA city from 15\9\07_15\1\08

PATIANTS AND METHOD:

274 consecutive patients, referred for U\S study of abdomen on an out patient basis. Indications of referral were variables. All of these patients were interviewed with a verbal questioner before receiving\S report; the aim of this questioner was to qualitatively assess daily dietary salt intake (and preference) The questioner is as follow:

I. Firstly I asked each patient the following questions:

a a :1

If the response was: as usual (without adding more salt), I asked:

a :2

If the response was: NO:

: () a :3
() a :

Types of served foods asked for generally were of two classes:

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1: Minor class (as: citrus fruits, yogourt, tomatos, cucumbers, salads), and meals served outside home

2: Major class (home made served meals on daily basis as varieties of broths, soups, and rice)

If the response was:

:

I repeat the question in different sequence as:

) () a ... a ...

(

If the response was confirmatory

:

I repeated the serial questions from 2-5.

II: Secondly

I studied the U\S report and register the findings as:

1: +ve Nephrolithiasis if there is renal stone any where in the urinary system, or there are only coarse crystals, or absent in patient who already labeled as a case of Nephrolithiasis by two recognized ultrasonographsts (this was accomplished by asking all the patients about the reasons of being referred for U\S study)

2: -ve Nephrolithiasis (excluding those who already labeled as a case of Nephrolithiasis)

III: Thirdly:

asked about family history of Nephrolithiasis (in first relatives), documented by a +ve U\S report confirmed by specialized surgeon with prolonged history of treatment.

INCLUCION CRITERIA:

1: preserved renal cortical thickness.

2: no\mild hydronephrosis (all due to lower ureteric stones, proved by IVU).

3: normal U\S report in patient with documented previous symptomatic Nephrolithiasis.

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EXCLUSION CRITERIA:

1: acutel ill patients, necessitating hospitalization.

2: essential hypertensive patients advised for low salt intake.

3: patients with multiorgan diseases (as heart failure, chronic liver disease, suspected prolonged debilitating illness, malignancy).

- 4: poorly controlled diabetes mellitus with suspected nephropathy.
- 5: children\ adolescents <18 years o; and elderlies >70 years old.
- 6: pregnant females.
- 7: any chronic structural renal disease (chronic renal failure, acute renal failure, prolonged obstructive uropathy).
- 8: nephritic\ nephritic syndromes.
- 9: nephrocalcinosis (multiple cortical calcifications).
- 10: staghorn stones (confirmed by IVU).
- 11: radiolucent stones (pure uric acid stones).

RESULTES:

The two groups (those prefer vs. don't prefer HSI.)are matched in age and residence, but not in sex and +ve family history, as shown in Table I.

Table I: Patient Criteria

		Prefer HSI	Don't Prefer HSI
AGE (18-65)		.	.
SEX	MALE		
	FEMALE		
RESIDENCE	RURAL		
	URBAN		
FAMILY CLUSTERING	+VE		
	-VE		

+ve Nephrolithiasis (Nephro.) group contained 80 patients, was compared to -ve Nephrolithiasis group which contained 194 patients. 54 patients with Nephrolithiasis prefer and consume high salt intake (HSI), while 26 don't, compared to 8 patients who prefer and consume HIS while 187 do not (P value: < 0.001, χ^2 : 133.6, Relative Risk: 7.375) as shown in Table II.

TABLE II: Frequencies of Nephrolithiasis and HSI:

	+Ve Nephrolithiasis	-Ve Nephrolithiasis
Prefer HSI		
Do not prefer HIS		
Pvalue	<0.001	Chi ² :133.6

When these results are matched to male sex using matched pair 2 by 2 box: 40 diseased males do have HSI, while 10 don't, compared to 14 female patients who do have HIS, while 16 female patients don't (P value: <0.01, >0.001, chi²:7.3846, Relative Risk: 2.21) as shown in Table III.

Table III: Frequencies of HSI and diseased males:

	+Ve Nephrolithiasis	-Ve Nephrolithiasis
Prefer HSI.		
Don't prefer HIS		
P value	<0.01 >0.001	Chi ² :7.3846

The Relative Risks (7.375 vs. 2.21) between these 2 tables were significantly different, indicating that the male sex is a confounding factor in HSI, but still both variables have strong correlation between them (<0.001 vs. <0.01 >0.001).

Family clustering is a confounding factor in the prevalence and consumption of HSI. 40 patients who had +ve family history did have HSI, while 14 patients didn't, compared to 12 patients who had -ve family clustering did have HSI, compared to 14 patients who didn't (P value: <0.1 >0.05, chi²: 2.9397, Relative Risk: 1.604). RR between two tables I and II (7.375 vs. 1.604) were significantly different, indicating

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that the family clustering is a confounding factor in HSI., preference and consumption of HSI have family clustering, but there was a weak association between family clustering and consumption of HSI among Nephrolithiasis patients (P value: <0.10 >0.05), as shown in table IV.

Table IV: Frequency of HSI and family clustering.

	+ve Nephrolithiasis	-ve Nephrolithiasis
Prefer HIS	40	14
Don't prefer HIS	12	14

P value	<0.10 >0.05	Chi ² : 2.9397
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DISCUSSION:

Sodium and Calcium show common sites of reabsorption in the renal tubules.. Sodium excretion by renal tubules augment urinary calcium excretion. Increase of salt intake promotes a variety of effects, it enhances urinary Calcium excretion, increases all kidney stone formation rate, increases urinary PH, and decreases urinary citrate excretion.^(1,5,7)

Habitual HSI may be an etiological factor in the generation of excessive excretion of Calcium, Sodium, and Phosphate in Hypercalciuria syndrome.⁽⁵⁾

In males with recurrent Calcium oxalate stones and Hypercalciuria, restricted intake of animal protein and salt, compared with normal Calcium intake, provide greater protection than the traditional low Calcium diet.^(3,5,7)

No earlier published study shows a constant association between preference and consumption of HIS and the risk of developing Nephrolithiasis, matched to male sex and family clustering. It seems that there is an unidentified factor (probably sex related) has possible etiological influence on preference and consumption of HIS, which in turn is a controlling factor in the developing Nephrolithiasis (Hypercalciuria);and that factor might constitute a significant proportion in idiopathic hypercalciuric patients and idiopathic calcium stone former group.

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