

Factors affecting renal calculi in adult males and females patients in Haryana

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The present study was conducted to assess the etiology factor of renal calculi. Preliminary survey was carried out on 200 respondents (male 100 and female 100) suffering from renal calculi between the age of 30 to 60 years from both Ambala and Hisar cities. Majority of the renal calculi patients (male and female) were using water from hand pump for drinking purpose in both the cities. Majority of the renal calculi patients (male and female) have suffered from urinary tract infection. Majority of the renal calculi patients (male and female) consumed more than 4 cups of tea/day and consumed less than 4 glasses of water/day in both the cities. Majority of the family members of renal calculi patients suffered from hypertension followed by diabetes mellitus and obesity. It is concluded that etiological factors, family history and medical history increased the occurrence of renal calculi.

Key Words : Renal calculi, Hypertension, Diabetes mellitus, Obesity, Urinary tract infection, Water

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INTRODUCTION

Renal calculi are a worldwide health problem affecting millions in both developed and developing countries. The prevalence of renal calculi and the rate of calculi recurrence still remain high (Chandhoke *et al.*, 2008). It has been estimated that 5 to 15 per cent of the population will develop renal calculi during their lifetime (Levy *et al.*, 2005). The recurrence rate is high ranging from 10 to 23 per cent per year (Krepinsky *et al.*, 2000). Diet plays a major role in the development of renal calculi and dietary changes likely to have contributed to the substantial increase in nephrolithiasis over the past several decades. A wide variety of dietary factors either promotes or inhibits the formation of calcium oxalate renal stones (Moe, 2006; Taylor and Curhan, 2006). About 80 per cent of renal calculi contain calcium and majority of calcium stones consist

primarily of calcium oxalate (Coe *et al.*, 2002). Men are more commonly affected than women with a male to female ratio of 3:1. The peak age for developing stones is 30 to 50 years and recurrence is common. Geographic variations exist in stones prevalence and regional stones belts have been identified and attributed to genetic and environmental factor such as hot climate (fluid loss) and sun exposure (vitamin D). An increasing in fluid intake is routinely recommended for patients who have renal calculi to decrease the likelihood of recurrence. Higher fluid intake leads to increased urinary volume and in turn to a decreased concentration of lithogenic factors presumably decreasing the rate of stones formation (Roy *et al.*, 2006).

METHODOLOGY

Preliminary survey was carried out on 200 respondents (male 100 and female 100) suffering from renal calculi between the age of 30 to 60 years from both Ambala and Hisar cities. These respondents were selected on the basis of X-ray and ultrasound examination from various government and private hospitals.

Source of drinking water:

Water source means source of drinking water used by

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the respondents. The scores were given as follows:

Water source	Scores
Hand pump	1
Municipal supply/ tap water	2

Consumption of water:

Consumption of glasses of water (350 ml water/glass) by respondents were recorded and the scores assigned to various groups are as follows:

No. of glasses	Scores
<4 glasses/day	1
4-6 glasses/day	2
>7 glasses/day	3

Urinary tract infection:

It refers to the infection occurs in urinary tract. The scores assigned are as follows:

Urinary tract infection	Scores
No	1
Yes	2

OBSERVATIONS AND ASSESSMENT

The results of the present study as well as relevant discussions have been presented under following sub heads:

Etiological factors for renal calculi:

Results on etiological factors for renal calculi have been

summarized in Table 1. It is evident that the highest incidence of renal calculi disease observed among males who exposed to sunlight for 2 to 4 hours/day (Ambala 50 % and Hisar 52%) and females who exposed to sunlight for 2 to 4 hours/day, 38 per cent of Ambala and 42 per cent of Hisar. In Ambala 30 per cent males and 56 per cent of femals exposed to sunlight for 0 to 2 hours/day and 20 per cent males and 6 per cent females exposed to sunlight for 4 to 6 hours/day. Similarly in Hisar city, 28 per cent males and 54 per cent of females exposed to sunlight for 0 to 2 hours/day and 20 per cent males and 4 per cent females exposed to sunlight for 4 to 6 hours/day. The majority of renal calculi patients were utilizing hand pump water for drinking purpose in both Ambala and Hisar city. According to Atan *et al.* (2005) higher ambient temperature, age and gender were associated with increased incidence of renal calculi in warmer months. Baker *et al.* (1993) reported that increased vitamin D production during summer and increased exposure to sunlight may leads to increased stones formation.

Data on urinary tract infection revealed that majority of the renal calculi patients 60 per cent (males) and 72 per cent (females) from Ambala and 64 per cent (males) and 78 per cent (females) from Hisar city, had suffered from urinary tract infection. Kumar and Singh (2006) carried out a study on 52 cases of stones disease and found high occurrence of urinary tract infection. They reported that urinary tract infection is important risk factors for stones formation.

Table 1: Etiological factors for renal calculi

Risk factors	Ambala		Hisar	
	Male (n = 50)	Female (n = 50)	Male (n= 50)	Female (n =50)
Duration of exposure to sunlight				
0-2 h/day	15 (30.0)	28 (56.0)	14 (28.0)	27 (54.0)
2-4 h/day	25 (50.0)	19 (38.0)	26 (52.0)	21 (42.0)
4-6 h/day	10 (20.0)	3 (6.0)	10 (20.0)	2 (4.0)
Drinking water source				
Hand pump	31 (62.0)	29 (58.0)	33 (66.0)	34 (68.0)
Municipal supply/tap water	19 (38.0)	21 (42.0)	17 (34.0)	16 (32.0)
Urinary tract infection				
Yes	30 (60.0)	36 (72.0)	32 (64.0)	39 (78.0)
No	20 (40.0)	14 (28.0)	18 (36.0)	10 (20.0)
Tea consumption				
1 cup/day	9 (18.0)	9 (18.0)	10 (20.0)	7 (14.0)
2-4 cups/day	19 (38.0)	18 (36.0)	19 (38.0)	18 (36.0)
> 4 cups/day	22 (44.0)	23 (46.0)	21 (42.0)	25 (50.0)
Daily water consumption				
< 4 glasses/day	32 (64.0)	30 (60.0)	33 (66.0)	31 (62.0)
4-6 glasses/day	12 (24.0)	15 (30.0)	13 (26.0)	14 (28.0)
> 7 glasses/day	6 (12.0)	5 (10.0)	6 (12.0)	5 (10.0)

n = number of respondents, Values in parentheses are percentages

Data regarding the consumption of tea revealed that 44 per cent males and 46 per cent females renal calculi patients were consuming more than four cups of tea/day in Ambala city. Thirty eight per cent males and 36 per cent females were consuming 2 to 4 cups of tea/ day in Ambala city. Similarly, in Hisar city, 42 per cent male and 50 per cent female consumed more than four cups/day followed by 38 per cent males and 36 per cent females consuming 2 to 4 cups of tea/day (Table 1).

Values in parentheses are percentages:

The majority of the males (64%) and females (60 %) renal calculi patients were consuming less than 4 glasses of water/day followed by 24 per cent males and 30 per cent females were consuming 4 to 6 glasses of water/day. Only 12 per cent males and 10 per cent females were consuming more than 7 glasses of water/day in Ambala city. Similarly, in Hisar city, 66 per cent males and 62 per cent females were consuming less than 4 glasses of water/day followed by 26 per cent and 28 per cent males and females were consuming 4 to 6 glasses of water/day. Twelve per cent males and 10 per cent females renal calculi patients were consuming more than 7 glasses of water/day. A randomized controlled study, showed that the calcium stone former who increased their water intake in order to increase their urine volume from approx. 1 to approx 2. L/day, during 5 years had a recurrence rate of 12 per cent as compared to 27 per cent who had not changed their water intake (Schwartz *et al.*, 2002).

Medical history of renal calculi patients:

Data pertaining to medical history of the respondents (Table 2) showed that 25 per cent of renal calculi patients in Ambala city and 28 per cent of renal calculi patients in Hisar city were suffering from hypertension. In Ambala city, 53 per cent and in Hisar city, 59 per cent of renal calculi patients were having diabetes mellitus. In Ambala city, 46 per cent of renal calculi patients and in Hisar city, 48 per cent of renal calculi patients had gout. In Ambala city, 12 per cent and in Hisar city, 9 per cent of renal calculi patients had arthritis. Seventy six per cent of renal calculi patients from Ambala and 72 per cent of renal calculi patients from Hisar city were suffering from obesity. Siener *et al.* (2004) showed the influence of overweight and obesity in calcium oxalate stones former. Domingos and Sena (2011) reported that the prevalence of kidney stones was 7.3 per cent. The prevalence of hypertension was higher among kidney stones former as compared with the general population (50.4% vs 30.2%). Age and obesity significantly increase the risk of nephrolithiasis. In Ambala city, 51 per cent of renal calculi patients and in Hisar city, 49 per cent of renal calculi patients were found not to have any type of health problem except renal calculi.

Family history of renal calculi patients:

Data presented in Table 3 revealed that in Ambala city, fathers of 33 per cent and mothers of 48 per cent of renal calculi patients were obese. In case of siblings, brothers of 15 per cent and sisters of 26 per cent of renal calculi patients were found to be obese. In Hisar city, fathers of 15 per cent,

Table 2 : Medical history of renal calculi patients

Disease or degenerative disease *	Ambala n=100	Hisar n=100
Hypertension	25 (25.0)	28 (28.0)
Diabetes mellitus	53 (53.0)	59 (59.0)
Gout	46 (46.0)	48 (48.0)
Arthritis	12 (12.0)	9 (9.0)
Obesity	76 (76.0)	72 (72.0)
None	51 (51.0)	49 (49.0)

n= number of respondents, * Multiple responses, Values in parentheses are percentage

Table 3 : Family history of renal calculi patients

Health problem *	Ambala (n= 100)				Hisar (n= 100)			
	Father	Mother	Brother	Sister	Father	Mother	Brother	Sister
Obesity	33(33.0)	48(48.0)	15(15.0)	26(26.0)	15(15.0)	23(23.0)	17(17.0)	21(21.0)
Diabetes mellitus	32(32.0)	45(45.0)	19(19.0)	16(16.0)	30(30.0)	45(45.0)	15(15.0)	17(17.0)
Gout	11(11.0)	16(16.0)	2(2.0)	4(4.0)	9(9.0)	12(12.0)	7(7.0)	6(6.0)
Hypertension	41(41.0)	29(29.0)	14(14.0)	13(13.0)	39(39.0)	14(14.0)	27(27.0)	15(15.0)
Renal calculi	12(12.0)	9(9.0)	3(3.0)	3(3.0)	15(15.0)	7(7.0)	4(4.0)	2(2.0)

n= number of respondents, * Multiple responses, Values in parentheses are percentage

mothers of 23 per cent, brothers of 17 per cent and sisters of 21 per cent of renal calculi patients were obese. Diabetes mellitus was found in fathers of 30 to 32 per cent and mothers of 45 per cent of renal calculi patients from both cities. In Ambala and Hisar city, brothers of 19 and 15 per cent and sister of 16 and 17 per cent renal calculi patients were having diabetes mellitus. Fathers of 11 per cent and mothers of 16 per cent of renal calculi patients in Ambala city and fathers of 9 per cent, mothers of 12 per cent of renal calculi patients in Hisar city were suffering from gout. In Ambala and Hisar city, 41 per cent and 39 per cent of fathers, 29 per cent and 14 per cent of mothers of renal calculi patients were having hypertension. In Ambala and Hisar city, 12 per cent and 15 per cent of fathers, 9 per cent and 7 per cent of mothers, 3 per cent and 4 per cent of brothers and 3 per cent and 2 per cent of sisters had no any health problems. Badar *et al.* (2007) conducted the cross sectional study on the effect of family history on the age of urinary calculi patients and reported that 28.6 per cent had a positive family history for urinary calculi. Marickar *et al.* (2009) suggested the genetic predisposition is risk factors for urolithiasis. The study population consisted 2157 urinary stones patients interviewed in (2003-07). Out of 2157 patients, 349 patients have positive family history of stone disease.

LITERATURE CITED

- Atan, L., Andreeu, C., Silva, E.K., Pitta, R. and Srauqi, M. (2005). High kidney stone risk in working in steel industry at hot temperature. *Kidney Int.*, **65** (5) : 858-861.
- Badar, A., Asr, S., Hazhir, K. and Hasanzadeh, L.M. (2007). Family history and age at the onset of upper urinary tract calculi. *Urol. J.*, **4** (3): 142-145.
- Baker, P.L., Coyle, P. and Bais, R. (1993). Influence of season, age and sex on renal stone prevention of nephrolithiasis a systemic review and meta analysis of randomized trial. *Em. Urol.*, **56** : 72-80.
- Chandhoke, M., Freemantel, N. and Masen, J. (2008). Epidemiological investigation of urolithiasis. *Uro Int.*, **15** : 65-76.
- Coe, F.L., Maran, E. and Kavalich, A.C. (2002). The contribution of dietary purine- over consumption to hyperuricosuria in calcium oxalate stone formers. *J.Chroic.Dis.*, **115**(10): 2598-2608.
- Domingos, F. and Sena, A. (2011). Nephrolithiasis is associated with and increased prevalence of cardio-vascular disease. *Nephrol Dia. Trans.*, **26** (3) : 864-868.
- Krepinsky, M., Bianco, O., Martini, C., Petranlo, M. and Vitale, C. (2000). Studies of epidemiology and calcium metabolism. *Scand. J. Urol. Nephrol.*, **75** : 95-101.
- Kumar, R. and Singh, M. (2006). Urinary tract infections in patients with severe renal disease. *Ind. J. Urol.*, **24**: 132-137.
- Levy, A., Heynck, H., Schneider, H.J. and Tubert, F. (2005). Survey of urolithiasis in United State. *J.Urol.*, **73** : 198-207.
- Marickar, Y.M., Salim, A. and Vijay, A. (2009). Pattern of family history in stones patients. *Urol. Res.*, **37** (6) : 331-335.
- Moe, O.W. (2006). Renal stones: Pathophysiology and medical management. *Kidney Int.*, **367** : 333-344.
- Roy, P.R., Kulkarni, P.R. and Bhatt, P.B. (2006). Spectrum of stone composition: Structural analysis of 1050 upper urinary tract calculi from northern India. *Int. J. Urol.*, **24** : 491-494.
- Schwartz, B.F., Scheukuman, N.S., Bruce, E.J., Leslie, S.W. and Stoller, M.L. (2002). Calcium nephrolithiasis, effect of water hardness on urinary electrolyte. *Urol. Int.*, **48** : 123-127.
- Siener, R., Elbert, D., Nicology, C. and Hesse, A. (2004). The role of overweight and obesity in calcium oxalate stone formation. *Obes. Res.*, **12**:106-113.
- Taylor, E.N. and Curhan, G.C. (2006). Diet and fluid prescription in stone disease. *Renal Int.*, **26** : 135-140.

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