

Dietary assessment of the patients suffering from urinary calculi

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The objectives of the present research was to study the nutritional status, food habits and nutrient intake of the patients suffering from urinary calculi according to their age and sex. The study was conducted on 54 patients suffering from urinary calculi admitted in the clinics and hospitals for their treatment in Bhubaneswar and Cuttack, Odisha. The data was collected with the help of predesigned and pretested questionnaires and required tools. The results of the study revealed that majority of the patients belonged to the age group of 19-50 years and there was high male preponderance (3:5:1) among the patients. Most of them were sedentary workers and belonged to low income group. Most common symptom was colicky pain at renal angle and burning during micturition. Kidney stone was found among 42 per cent patients and the nature of stone was found to be calcium phosphate in majority cases. 27.8 per cent respondents were found to be moderately malnourished. No specific correlation was found between the type of water and type of calculi found in the patients. Calorie, protein, vitamin-A, calcium, phosphorus, magnesium, potassium content of the diet of the adult patients was found to be deficient in comparison to RDA whereas fat, copper and oxalate content was found to be excess in their diet. Protein content of the diet of the children was found to be more than RDA. Iron content of the diets of the adolescents and adults was found to be more than RDA whereas it was deficient in the diet of the children upto 9 years of age group. However, the variation may be due to sample size. Thus it can be suggested that an extensive study should be carried out on large sample to establish a relationship between dietary intake and prevalence of urinary calculi in human beings.

Key Words : Urinary calculi, Calorie, Protein, Recommended dietary allowance

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INTRODUCTION

Urinary calculi, one of the man's oldest documented miseries is still of unknown causation. Many still labour in stones. The pain may be in back but more often it originates in the abdomen and radiates downward to the bladder, the groin, the inner aspect of the thigh and the urethra. The pain may last from a few minutes to several hours or days, and it is one of the worst pains that human ever have to bear, but it may stop as suddenly as it began.

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There is increased frequency of urination sometimes associated with burning during micturition, haematuria, vomiting, chills and fever. About 3 per cent of Indian population are suffering from urinary calculi (Kothari, 1989). No race or geographical area is entirely free of them, but the incidence is greatest in Southern China, Northern parts of India, Northern Thailand, Arabia and Iraq (Holland *et al.*, 1985). Formation of calculi depends on the balance between the concentration of precipitating substances like calcium, phosphate, oxalic acid, uric acid, magnesium and the solubility of their salts, crystal inhibitors and crystal initiators in urine. Dietary imbalance in minerals, excess intake of diets rich in calcium,

phosphorus, vitamin-C, oxalic acid and purines have been implicated. Low fluid intake especially in warm climate may also precipitate this condition. However, role of diet in the formation of urinary calculi has not been well established till now. Therefore an attempt has been made in the present work to establish the relationship between dietary intake and prevalence of urinary calculi. The objectives of the present work were

- To study the socio-economic condition of the patients suffering from urinary calculi and their illness.
- To assess nutritional status of the respondents.
- To study the food habits and nutrients intake of the patients according to their age and sex.

METHODOLOGY

The study was carried out in twin city of Odisha *i.e.* Bhubaneswar and Cuttack on fifty four patients who were admitted in different Government and private hospitals for treatment of urinary calculi. They were selected by random purposive sampling method for the present study. The data was collected by interview cum questionnaire method with the help of pre designed and pre tested questionnaire regarding their family background, history of illness, etc. The diet survey was done with the help of 24 hours recall method. The height and weight of the respondents was recorded with the help of measuring tape and weighing machine, respectively. BMI was calculated for assessing the degree of malnutrition of the patients. The standard weight for height was taken from Srilakmi (2006) and Swaminathan (1985).

OBSERVATIONS AND ASSESSMENT

The collected data were tabulated, statistically analyzed and discussed below.

Age and sex :

Result of age and sex distribution of patients showed

Sr. No.	Age group in years	Total no. of male	Male (%)	Total no. of female	Female (%)	Total no.	Total (%)
1.	0-6	2	3.7	1	1.85	3	5.6
2.	7-12	5	9.3	1	1.85	6	11.2
3.	13-18	3	5.6	-	-	3	5.6
4.	19-29	7	12.96	4	7.4	11	20.4
5.	30-40	13	24.07	2	3.7	15	27.8
6.	41-50	8	14.8	3	5.6	11	20.4
7.	Above 50	4	7.4	1	1.85	5	9.26
	Total	42	77.83	12	22.26	54	100.0

that out of 54 patients, majority patients were between 30 and 40 years (27.8%) followed by 41-50 years (20.4%) and 19-29 years (20.4%). Thus 68.5 per cent patients were between the age group of 19-50 years. 22.4 per cent patients were between the age of 0-18 years. There was a high male preponderance (3:5:1) among the patients (Table 1). Similar results were also observed by Bakthavathsalam *et al.* (1985).

Family back ground :

It was observed that 58 per cent of the respondents were belonged to joint family. 64 per cent of the patients were from low income group family *i.e.* less than 1 lakhs income per year. Majority of them were Hindu by religion and 62 per cent of them were from rural area. Maximum number of patients (male as well as female) were sedentary workers *i.e.* 68.5 per cent whereas 16.7 per cent were moderate workers and only 14.8 per cent patients were heavy workers.

History of illness :

Table 2 depicts that only 9.3 per cent patients had family history of illness.

Colicky pain in renal angle (83.3%), burning during micturition (57.4%) and retention of urine (38.9%) were the most common symptoms observed among the patients. Haematuria (29.6%), pain in back and leg (27.0%), passing whitish urine (11.1%) were also found among patients. Other symptoms (35.2%) included fever, vomiting, loss of bodyweight etc. The present observations were similar to those reported by Rain *et al.* (1985).

Thirty seven per cent patients were suffering from the disease since one year or more whereas 20.4 per cent, patients were suffering from the disease since 5 year or more. Incidence of recurrent urinary calculi was found only in 14.8 per cent cases. 81.5 per cent patients were found to be anaemic.

X-ray examination :

From the X-ray report, the presence and location of calculi was noted down. Nature of calculi was decided by seeing the X-ray or the actual appearance in case of operated patients or for those passed calculi, according to Rain *et al.* (1985).

Table 3 shows that 42.5 per cent patients were

having kidney stones, 24.05 per cent were having ureter stones and 33.3 per cent were having bladder stones. Prevalence of calcium phosphate stones (57.4%) was more than calcium oxalate stones (24.07%). 14.8 per cent stones were seems to be uric acid in nature and 3.7 per cent stones were triple phosphate in nature.

Table 2 : History of illness of patients suffering from urinary calculi**(n= 54)**

Sr. No.	Characteristics	Frequency	Percentage
1.	Family history of illness		
	Yes	5	9.26
	No	49	90.74
2.	History of present illness		
	Burning during micturation	31	57.4
	Colicky pain in renal angle	45	83.3
	Haematuria	16	29.6
	Pain in back and leg	15	27.8
	Retention of urine	21	38.9
	Whitish urine	6	11.1
	Any other	19	35.2
3.	Period when the disease was first diagnosed		
	Since one month or more	12	22.2
	Since six month or more	4	7.4
	Since one year or more	20	37.04
	Since three year or more	7	12.96
	Since five year or more	11	20.37
4.	Frequency of occurrence of disease		
	Continuous	20	37.04
	8-15 days interval	7	12.96
	One month or more	16	29.63
	Six month or more	4	7.4
	One year	3	5.56
	Above one year	4	7.4
5.	Incidence of recurrent calculi		
	No recurrence	45	85.2
	Recurrent case	9	14.8

Table 3 : Location and kind of stone

Sr. No.	Characteristics	Number of stones	Percentage
1.	Location of stone		
	Kidney	23	42.55
	Ureter	13	24.05
	Bladder	18	33.3
2.	Kind of stone		
	Calcium oxalate	13	24.07
	Calcium phosphate	31	57.4
	Triple phosphate	2	3.7
	Uric acid	8	14.8

Nutritional status :

Table 4 depicts that 50 per cent of the patients were normal, 27.8 per cent patients were suffering from mild to moderate degrees of malnutrition and 22.2 per cent. Patients were suffering from severe degrees of malnutrition. According to Singh *et al.* (1978) in the developing nations the prevalence of urinary calculi is more among the villagers where the malnutrition is more common.

Water intake of the patients :

It was observed that 55.6 per cent surveyed patients were drinking soft water where as 44.4 per cent patients

were drinking hard water. To determine the relationship if any that existed between the type of calculi as assessed by X-ray reports and the type of drinking water used by the patients the data was tabulated and shown in Table 5.

No specific correlation could be observed between the type of water and the type of calculi. Almost equal percentage of patients were found to drink hard/soft water. The data regarding amount of water taken by the patients before diagnosis of disease showed that maximum patients were taking less than 2 litres water per day *i.e.* (62.93%). Only 14.8 per cent patients were taking water 3 litre/ day before diagnosis of disease. Tisellius (2009)

Table 4 : Nutritional status of the respondents according to BMI

Sr. No.	Nutritional status	No. of patients	Total percentage
1.	Severely malnourished	12	22.2
2.	Mildly to moderately malnourished	15	27.8
3.	Normal	27	50

Table 5 : Types of water/Types of calculi of the patients according to X-ray

(n=54)

Sr. No.	Type of calculi	Type of water			
		Hard water		Soft water	
		No.	Percentage	No.	Percentage
1.	Calcium oxalate	7	12.96	6	11.1
2.	Calcium phosphate	13	24.7	18	33.3
3.	Triple phosphate	2	3.70	-	-
4.	Uric acid	2	3.70	6	11.1
	Total	24	44.47	30	55.5

Table 6 : Proximate composition of diet of the patients suffering from urinary calculi according to age

(n = 54)

Nutrients / Age in yrs.	Calorie in Kcal	Protein in g	Fat in g	Carotene
1-3	704.25 D (1060)	26.5 E (16.7)	33.4 E (27)	199.75 D (3200)
4-6	987.575 D (1350)	29.56 E (20.1)	25.825 E (25)	3016.75 D (3200)
7-9	721.4 D (1690)	22.7 D (29.5)	18.6 D (30)	1359.2 D (4800)
10-12	1619.3 D (2190)	47.8 E (39.9)	29.98 D (35)	1981.9 D (4800)
13-15	1286.3 D (2750)	36.76 D (54.3)	36.02 D (45)	267 D (4800)
16-18	1396.45 D (3020)	45.06 D (61.5)	35.435 D (50)	299.05 D (4800)
Adult man	1943.07 D (2320)	52.25 D (60)	52.06 E (25)	1632.35 D (4800)
Adult women	1578.37 D (1900)	44.2 D (55)	47.7 E (20)	1548.6 D (4800)

Numbers given in parenthesis is the recommended dietary allowance
E- Excess, D- Deficient

found in their studies that water intake more than 2 litre per day and fewer intake of soft drink reduce stone recurrence as well as colic pain. Awasthi *et al.* (2011) also found similar things in their studies.

Food and nutrient intake patients suffering from urinary calculi :

Information on food habits and dietary pattern of the patients showed that majority (76%) of the respondents were non-vegetarian and were taking four meals (58%) per day. Raju *et al.* (1989) found in their studies 60 per cent of the patients were non-vegetarian and were consuming more salted foods. Shah *et al.* (2013) found majority of the patients took beef (0-2 times), milk and milk products (0-2times) and rice (>6times) per week.

Results of the Table 6 revealed that the calorie content of the diet of the patients belonging to all age groups was found to be deficient.

The protein content of the diet of the patients was found to be excess in 1-3 years, 4-6 years and 10-12 years age group but in rest of the age groups, the protein content of diet was found to be deficient. Tisellius (2009) found lower animal protein intake leads to higher chance of recurrence stones.

Proximate composition of the patients diet :

The fat content of the diet of the patients was found to be excess in 1-6 years of age group and in adult men

and women but it was deficient in rest of the age groups. Oliveria *et al.* (2015) found in their study high fat diet of rats had more micturitions, lower bladder capacity, lower compliance in comparison to rats taking normal diet.

The Vitamin-A content of the diet of the patients was found to be deficient in all age group.

Mineral of the patients diet :

Results from Table 7 postulated that the calcium content of the diet of the patients was deficient in all the age groups in comparison to RDA. Han *et al.* (2015) found that a higher calcium diet associated with lower kidney stone formation. Patients who consumed a diet with normal calcium intake with low protein diet had a 51 per cent lower incidence of recurrent stones.

The phosphorus content of the diets was found to be deficient all age groups except adult man and woman, 10-12 years and 16-18 years age group .

The iron content of the diets of the patients was found to be deficient in 1-3 year, 7-9 years and 13-15 years of age groups. In other age groups the diet was excess in iron.

The magnesium content of the diets of the patients was found to be excess in all age groups except in adult male female. Han *et al.* (2015) suggested that hypoglycemia is not a risk factor in stone formation.

The potassium content of the diets of the patients was found to be deficient in all the age groups which

Table 7 : Mineral contents of the diets of the patients suffering from urinary calculi according to age

Mineral/Age in years	Ca in mg	P in mg	Fe in mg	Mg in mg	K in kg	Cu in mg	Oxalate in mg
1-3	207.7 D (600)	361.25 D (800-1000)	7.65 D (09)	53.75 E (50)	612 D (937.5)	0.65 D (2)	20.75 D (250)
4-6	185.45 D (600)	556.825 D (800-1000)	29.325 E (13)	318.2 E (70)	1169.5 D (1350)	3.21 E (2)	240.6 D (250)
7-9	176.8 D (600)	477.65 D (800-1000)	13.02 D (16)	214.175 E (100)	910.75 D (1725)	2.02 E (2)	219.2 D (250)
10-12	469.2 D (800)	922.4 N (800-1000)	27.2 E (21)	238.85 E (120)	1017.1 D (2362.5)	2.78 E (2)	38.7 D (250)
13-15	216.65 D (800)	889.85 D (1200-1400)	23.175 D (32)	203.7 E (165)	1496.5 D (3000)	2.75 E (2)	76.6 D (250)
16-18	199.88 D (800)	1155.75 N (1000-1200)	34.96 E (17)	235 E (195)	1512.4 D (3600)	1.99 D (2)	4.7 D (250)
Adult man	632.03 D (800)	1142.94 N (800-1000)	28.4 E (17)	270.04 D (340)	2113.7 D (2500-3300)	2.68 E (2)	373.75 E (250)
Adult women	477.64 D (800)	868.785 N (800-1000)	24.33 E (21)	236.5 D (310)	1345.4 D (2500-3300)	2.34E (2)	285.5 D (250)

Numbers given in parenthesis is the recommended dietary allowance
D - Deficiency , E-Excess

varies from 13.4 per cent to 58 per cent.

The copper content of the diets of the patients were excess in all the age groups *i.e.* varies from 1.1 per cent to 60.6 per cent, except for the age group of 1-3 years (67.5%) and 16-18 years (0.5%) in which it was deficient.

The oxalate content of the diets of the patients was deficient in all the age groups except in the age group of 4-6 years, adult man and adult women.

Thus, it can be concluded that the nutrient content of the studied Urinary calculi patients was found to be deficient in all macro and micro nutrients in all most all age groups except fat, copper and oxalate.

Conclusion :

Due to limitation of time and practical difficulties in obtaining the calculi the study could not be conducted on a larger sample. It is strongly felt that-intensive studies should be taken up so as to arrive conclusively at the possible role of diet in calculi. Dietary restriction form a part of the treatment in this disease though it is done on a very generalized basis. Unless specific long term detailed studies are taken up with respect to the age, site of occurrence and type of calculi, and dietary intake of the patient the role of diet in urolithiasis will remain obscure

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