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Effect of gender, age and income on nutrient intake of selected kidney stone patients of Kangra district of Himachal Pradesh

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Abstract

A total of 130 kidney stone patients were selected randomly from Kangra district of Himachal Pradesh and the information regarding their age, income and nutrient intake was collected. Majority (46.15%) of the kidney stone patients were in age group II (30-45 years) and 32.31 per cent of kidney stone patients had monthly income less than ₹ 5000-10,000/-. Nutrient intake by selected kidney stone patients revealed that the mean intake of energy, carbohydrates and fats was lower than RDA while protein intake was slightly higher than RDA. There was higher intake of protein and oxalates by male kidney stone patients than female kidney stone patients and with the advancement in age and income the intake of protein decreased.

Key words: Kidney stone patients, income, nutrient intake, regression.

Introduction

Among urinary tract disorders, kidney stones are one of the most common afflictions which have affected human beings since ages. They constitute a significant proportion of the urological disorders and morbidity. Kidney stones can be defined as concretion of material usually mineral salts formed in an organ or duct of the body (Lock, 2001). Presence of kidney stones may lead to swollen kidneys, infections of kidneys and finally to kidney failure. The prevalence of kidney stones in India is 15 per cent and approximately 5 to 7 million patients are suffering from this painful disease. Prevalence of kidney stones can be divided into two geographical belts. North India forms the 'First Stone' belt, while parts of Maharashtra, Gujarat and Jabalpur in Madhya Pradesh forms 'Second Stone' belt. The occurrence of this disease is high in the northern, north western and central part (Kak, 2008).

Common epidemiological risk factors for kidney stones are age, gender, socioeconomic status and food habits of individuals. Men are affected three times more than women. The highest incidences of kidney stones have also been reported among upper class (Anderson, 1972). Diet plays an important role in determining urinary chemistry and may influence the risk of stone formation. It influences urinary constituents and pH which may affect stone nucleation and growth. Dietary factors include a high intake of animal proteins, calcium, oxalates and a low intake of potassium containing citrus fruits (Pak, 2004). Therefore, the present study was planned to estimate the nutrient intake of kidney stone patients with their role in stone formation and effect of gender, age and income on nutrient intake.

Methodology

A total of 130 kidney stone patients (78 males and 52 females) were selected randomly from various medical institutions such as CSK HPKV Health centre, Civil Hospital Palampur and Karan Hospital, Palampur (Himachal Stone Clinic) of Kangra district

(Himachal Pradesh). A comprehensive and exhaustive questionnaire was formulated specifically keeping in mind the objectives of the study. The sample questionnaire was presented to 10 kidney stone patients other than the selected patients and was then evaluated for response of the patients. The necessary improvements /alterations/modifications were incorporated on the basis of collected information, thus making the questionnaire more functional. A 24-hour recall method for three consecutive days was used to collect information regarding food intake. The amount of cooked food consumed was converted into raw ingredients and the nutrient intake was calculated by using the value per 100 grams of edible portion using Food Composition Table (Gopalan *et al.*, 2000). Nutrient intake for three consecutive days was taken and the calculated mean values were used for further analysis. The mean nutrient intake by the patients was compared with RDA (Gopalan, *et al.*, 2000 and Holmes and Kennedy, 2000). The requisite information was collected from the selected kidney stone patients. The data were statistically analyzed to find out various differences and associations among variables using chi square test given by Snedecor and Cochran, 1967.

Results and Discussion

Personal Profile: Personal profile of kidney stone patients is presented in Table 1. Among all patients, maximum numbers of patients i.e. 46.15 per cent were in Group II, 33.08 per cent patients were in age Group I and remaining 20.77 per cent patients were in Group III.

The variation in monthly family income of male and female kidney stone patients was significant (at 1 % level of significance). Majority (30.77%) of the male kidney stone patients had monthly income in the range of ₹ 5000-10,000 per month. 21.79 per cent of male patient were earning ₹ 10,000-15,000 per month. 20.51 per cent of them were in income range of ₹ 15,000-20,000 per month. 14.11 per cent of male patients were earning more than ₹ 20,000 per month and monthly earnings for 12.82 per cent was less than ₹ 5000. In case of female patients, 34.61 per cent patients had total monthly income of ₹ 5000-10,000. Other 28.84 per cent of female patients had monthly income of below ₹ 5000 per month. Monthly household income for 23.08 per cent of female patients was in the range of ₹ 10,000-15,000. About 9.62 per cent of female patients had monthly income of ₹ 15,000-20,000. Rest 3.85 per cent had monthly income above ₹ 20,000 per month. The results are similar to that of Kumari and Dahiya (1999) who reported high incidence of kidney stone in middle income groups (₹ 6000 per month).

Nutrient profile

Macronutrient intake: Energy intake of male and female selected kidney stone patients varied non-significantly with age and was little lower than RDA. In case of males, the energy intake was 2563.12±54.38 Kcal, 2376.67 ± 39.30 Kcal, 2550.02±38.72 for age group I, II and III, respectively, with mean intake of 2474.55± 28.79 Kcal. For female kidney stone patients it was 2056.92±60.56 Kcal, 1921.26±51.30 Kcal, 1935.74±79.17 Kcal for age group I, II and III, respectively with mean intake of 1966.34±35.85 Kcal.

Table 1. Personal Profile of selected kidney stone patients

Variables	Male (n=78)	Female (n=52)	Total (N=130)
Age (Years)			
≤30 (Group I)	27 (34.62)	16 (30.76)	43 (33.08)
30-45 (Group II)	36 (46.15)	24 (46.16)	60 (46.15)
Above 45 (Group III)	15 (19.23)	12 (23.08)	27 (20.77)
Monthly Income (₹)			
<5000	10 (12.82)	15 (28.84)	25 (19.23)
5000-10,000	24 (30.77)	18 (34.61)	42 (32.31)
10,000-15,000	17 (21.79)	12 (23.08)	29 (22.31
15,000-20,000	16 (20.51)	5 (9.62)	21 (16.15)
≥20,000	11 (14.11)	2 (3.85)	13 (10.00)

χ^2= **8.36**** **Significant at 1 per cent level
Figures in the parentheses indicate percentages

Protein intake of selected male and female kidney stone patients was found to be 66.34 ± 0.81 g and 55.14±0.95 g, 65.03±0.98 g and 55.69±0.79 g, 63.81±0.96 g and 51.93±2.18 g for age group I, II and III, respectively. The mean intake was 65.25 ± 0.56 g for male kidney stone patients and 54.66±0.69 g for female kidney stone patients and was higher than RDA.

Total fat intake of male kidney stone patients was found to be 48.92 ± 0.78 g, 49.77 ± 1.02 g and 49.19±1.35 g for age group I, II and III, respectively. While total fat intake as calculated in female patients was 45.92±1.65 g, 45.21±1.90 g and 45.36±1.75 g for age group I, II and III, respectively. The mean intake of total fat for male and female selected kidney stone patients was 49.37±0.59 g and 45.46±7.81 g, respectively. Moreover, a significant (at 5 % level) difference was found between mean total fat intake of male and female patients of all age groups. The intake of fats of kidney stone patients of all age groups was lower than RDA.

The carbohydrate intake of selected male and female kidney stone patients varied significantly (at 1 % level) for age groups I and III, respectively and the mean intake was low than the RDA for males of all age groups and females of age group II and III. The intake of carbohydrates for male and female kidney stone patients was 384.43±16.02g and 367.22±11.69g, 382.84±8.18g and 325.17±9.56g, 352.95±20.53 and 311.78±18.19 g for age group I, II and III, respectively. The mean intake was 377.64±7.79g for male kidney stone patients and 335.02 ± 7.63g for female kidney stone patients.

Oxalate intake: Oxalate intake was 133.53±6.33 mg, 118.66±5.02 mg and 124.61±7.75 for age group I, II and III, respectively for males (Table 3). In females, it was 113.64±6.47 mg, 104.95±7.44 mg and 106.95±9.30 mg for age group I, II and III, respectively. The mean intake was significantly different (at 1 % level) for male and female kidney stone patients i.e. 124.95±3.55 mg for males and 108.09±4.49

mg for females. Massey and Suttan (1993) reported that oxalates bind to calcium and form kidney stones. Gasinska and Gajeswka (2007) concluded that frequent consumption of oxalate rich foods such as tea and coffee is a significant risk factor for kidney stones.

Table 2. Macro-nutrient intake of selected kidney stone patients

Nutrients	Age group			Mean	RDA
	Group I (n_m=27) (n_f=16)	Group II (n_m=36) (n_f=24)	Group III (n_m=15) (n_f=12)	(n_m=78) (n_f=52)	
Energy (Kcal)					
Male	2563.12±54.38	2376.67±39.30	2550.02±38.72	2474.55±28.79	2875
Female	2056.92±60.56	1921.26±51.3	1935.74±79.17	1966.34±35.85	2225
t- value	1.18	0.58	0.74	1.28	
Protein (g)					
Male	66.34±0.81	65.03±0.98	63.81±0.96	65.25±0.56	60
Female	55.14±0.95	55.69±0.79	51.93±2.18	54.66±0.69	50
t-value	1.49	1.95	4.88**	0.28	
Total fat (g)					
Male	48.92±0.78	49.77±1.02	49.19±1.35	49.37±0.59	30% of
Female	45.92±1.65	45.21±1.90	45.36±1.75	45.46±7.81	Energy (96&74)
t- value	1.72*	2.30*	1.72*	3.39**	
CHO (g)					60-65%
Male	384.43±16.02	382.84±8.18	352.95±20.53	377.64±7.79	of Energy
Female	367.22±11.69	325.17±9.56	311.78±18.19	335.02±7.63	(445 & 339)
t- value	4.68**	1.44	5.66**	3.73**	

*Significant at 5 per cent level **Significant at 1 per cent level
Values are Mean ± S.E; n_m= number of male subjects; n_f= number of female subjects

Table 3. Oxalate intake of selected kidney stone patients

Particulars	Age Group			Mean	RDA
	GroupI (n_m=27) (n_f=16)	Group II (n_m=36) (n_f=24)	Group III (n_m=15) (n_f=12)	(n_m=78) (n_f=52)	
Oxalate (mg)					
Male	133.53±6.33	118.66±5.02	124.61±7.75	124.95±3.55	Min. 50
Female	113.64±6.47	104.95±7.44	106.95±9.30	108.09±4.49	ıg/day#
t- value	1.85*	1.59	1.45	2.96**	

Values are Mean ± S.E.
*Significant at 5 per cent level
n_m= number of male subjects;
##Holmes and Kennedy (2000)
**Significant at 1 per cent level
n_f= number of female subjects

Regression coefficients of nutrient intake (g/day) on age, gender and income of selected kidney stone patients

It is clear from the Table 4 that male patients had significantly (at 1 % level of significance) higher protein intake (10.81 g more) and oxalate intake (12.45 mg more) than female kidney stone patients. This difference can be attributed to modulation of nutrient intake, physical activities and socio-cultural patterns. Protein and oxalate intake was found to be decreasing by 0.036 g/day and 0.26 mg/day as the age of kidney stone patients increase by one year. The reason behind this can be attributed to decrease in digestion power with age resulting in low food intake. But the effect of income on protein and oxalate intake was significantly positive (at 1 % level of significance). The quantity of protein and oxalate increased by 0.0003 g/day and 0.002 mg/day respectively, with increase in one ₹ income of kidney stone patients.

This may be attributed to increase in purchasing power and daily planning of diet with more diversification. The variable estimated for protein were found yielding good explanatory power of model as shown by significant value of R^2 (0.5698). This shows that variables included in the model explained 56.98 per cent of variation in the protein intake. The variable for oxalates included in the model explained 32.34 per cent of variation in oxalate intake. Though R^2 was significant but it reveals low explanation power and this may be due to the effect of excluded variables like taste, preferences, availability and due to erratic behaviour of individuals.

Table 4. Regression coefficients of protein intake (g/day) on various factors of selected kidney stone patients (N=130)

Variables	Coefficients	
	Protein	Oxalates
Intercept	52.1741 (1.9081)	95.7262 (9.7867)
Gender (M=1, 0 otherwise)	10.8157* (0.9596)	12.4525* (4.9218)
Age (Years)	-0.0362 (0.04772)	-0.2684 (0.2447)
Income (₹)	0.0003* (0.00006)	0.0020* (0.0003)
R^2	0.5698*	0.3234*
F value	(55.63)	(20.07)

Significant at 1 per cent level Figures in the parentheses indicate S.E.

Similar results were reported in a study by Jeffery *et al.* (1986) in which more intake of calcium and B-complex vitamin was in younger age persons. Also males had more nutrient intake than females. Kawatra and Sehgal (1998) reported a positive association of nutrient intake (Energy, Protein, Vitamin C and Iron) with increase in income.

From the present study, it can be concluded that maximum patients were suffering from kidney stones in age of 30-45 years i.e. during more productive years. Nutrient intake by

selected kidney stone patients revealed that among macro-nutrients, the intake of energy, protein and carbohydrate was found to be the highest by male kidney stone patients of age group I (less than 30 years). The mean intake of energy, carbohydrates and fats was lower than RDA while protein intake was slightly higher than RDA. The intake of oxalates was also higher than RDA for all kidney stone patients and it was higher for male and females of age group I which may be a reason of kidney stones. Regression studies revealed that there was significantly higher intake of protein and oxalates by male kidney stone patients than female kidney stone patients. With the increase in age, the intake of protein and oxalate was decreasing. Also the intake of oxalates was increasing significantly with increase in income.

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