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Studies on Food Habits of Calcium Urolithiasis Patients in Kishanganj District in Bihar, India

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Abstract: ***This research paper is based on the observation and study of patients with Calcium Urolithiasis commonly known as Kidney Stone. The patient lifestyle, surroundings, food, and dietary habits of those who are regularly visiting major Mysore City hospitals have observed. The average age of people affected by this disease was above 20 years. More men of younger age groups are largely affected. The patient infected with this disease was found to have some series of problems like urine infection, difficulty to urinate, and plain in that region. Some parameters of this disease were considered to be in the normal range for the majority of cases like Somatic assessment, Urea creatinine, and other biochemical disorder.Some people commonly affected by this disease were agricultural laborers where their food habits were considered to be quite improper, and the intake of leafy green vegetables and fruits was low. As well as consumption of energies was lower than Recommended Dietary Allowances. Concentration of people affected by this disease in different geographical areas and the risk involved must be analyzed.***

Keywords: Urolithiasis, Somatic status, Biochemical profile, Food habits, Nutrient intake

1. Introduction

Urinary stone begins to form in kidney and enlarger in a ureter. This urinary stone was found in ancient time people who lived in that age have faced this problem. This disease was even detected in Egyptian Mummies during 4800 BC. Hippocrates famous physician pointed out about this disease as “I will not cut, even for the stone, but leave such procedures to the practitioners of the craft”.

[1] The rise of kidney stones was observed only in the past 100 years. The idiopathic stone in various countries may be related to the economic development of those countries. In some developing countries, a higher occurrence of childhood bladder stone was detected. On the hand in some developed countries, the kidney stone was observed in adults in larger number.

[2] Urinary Stone was previously known as Idiopathic Bladder Stone. This occurs in the young age of kids, especially affecting male. This disease was predominately found in Western Europe and England almost 100 years back. But now this is quite uncommon in those countries. In present time found in countries like Thailand, Indonesia, Northwest India, Middle east and Egypt.

[3] The occurrence of Idiopathic stone disease may be due to several reasons like External factor and Internal factor. The external factor involves climate, diet plan, financial situation, and intake of fluid etc. Internal factors involve age, gender, inherited and genetic factor.

[2, 4, 5] Some well-known factors of Idiopathic stone disease are due to increased evacuation of calcium, uric acid, and oxalate. From several studies it is found that the diet plan of some western countries may be reason for increase calcium oxalate crystallization in urine, which decreases the activity of urinary bladders.

[3, 6] The calculogenic diet is the type of diet that changes the urinary pH so that certain salts are kept in solution and excreted in urine. The threat factor of this diet includes growing out of diet plans and the one who are under-nutritioned. Malnutrition may also be the reason for this disease when thinking of other countries in the world.

[7] Several form of diet has been included in order to overcome this disease, which includes intake of protein from animals, calcium, dietary fiber, etc.

[3-4] Many research and studies have been carried out to illustrate the increase of urine extraction with calcium, oxalate, and uric acid. They are the reason for formation of calcium stone. Many studies on analysis of renal stone are accessible in some regions of India.

[8-11] From many reports from India it is recorded that calcium oxalate is the major reason for this type of Stone disease.

[12] The data on patient affected with renal disease due to nutrition and diet plans was not available. But this research paper tries to highlight the lifestyle, surrounding factor, and food habits of the person affected with urolithiasis. This paper tries to access the dietary plan by utilizing somatic measurements, some biochemical and intake of food report.

The study area is selected as Kishanganj district in Bihar is situated at the eastern part of India touching Nepal and Bangladesh boarders. It is located at 56m high from sea level. The climate of Kishanganj is mild. It receives frequent rain throughout the year. The average temperature is 24.8 ˚C or 76.6˚F. Calcium Urolithiasis or kidney stone disease is one of the most prevalent disease in this region. It is known as endemic stone belt. In India kidney stone disease is prevalent in many parts like Maharashtra, Kerala and Tamil Nadu. It’s the most common disease in the eastern part of country like Assam, Bihar, Jharkhand and Manipur.

2. Methodology

The survey for this study was conducted in Mata Gujri Memorial Medical College, and Hospital in Krishanganj District in Bihar. Confirmed patients of different age group and gender were provided with the questionnaire. The

questionnaire contained around 12 questions related to eating habit and some other disease related questions. The patients or the guardian were told to fill the questionnaire with the honest answer.

The questionnaire was framed with questions like enquires about the previous and current complaint, personal details about the patients which includes smoking and drinking habits, family history on any kind of same disease, etc.

Investigation of biochemical factors: Some biochemical tests like: hemoglobin test, blood urea, and creatinine, urinary glucose, etc. were carried out in hospital are noted as question. These test were measured utilizing diagnostic methods in the hospital.

[13] The hemoglobin level of the patient was measured through cyanmethemoglobin method.

[14] With regular method the blood glucose, urea, and creatinine was measured.

Anthropometric Assessment: Weight of the patients was measured, 100g standard balance in less weight clothes and without shoes. The MUAC measured on left hand, using measuring tape. The measurement was noted in mm. The skin fold measurement was taken using Lange skin fold calipers in 0.2 mm. The measurement was taken at the right side of body in the parts of bicep, triceps, etc. The measurement in the waist and hip was taken at 0.1 inch using measuring tapes. The measurement of the patient in the standing position was taken on the relaxing zone of the subject.

The dietary plan and food habit of the subject was noted using questionnaire. In order to know the food habit and consumption of the subject they were interrogated on the food intake on the previous days. This study and measurements was taken only after the approval of hospital authorities.

3. Result

3.1 Disease History and Personal Data of the Subjects

This study was done in a local hospital. The hospital involved in this study is MGM Medical College and Hospital. The interview was done for almost six months with nearly 130 patients affected with Urolithiasis. The subject of the study was found to be men.

In the study it is found that nearly patients above 20 years are affected by this disease. In the age group of 20 – 30 year men was found be affected in larger number. In the age group of 31- 40 it was found to be 34 percent, in the age group of 41 to 50 it was found to be 13 percent, in the age group of 51 to 60 it was found to be 15 percent, and the person above age 60 it was found to be 10 percent. All the age group yielded less percent when compared to 20 to 30.

Table 1: Age-Wise Distribution of Subjects and Disease Symptoms

Symptoms	Age group				
	20-30 n = 45	31-40 n = 34	41-50 n = 13	51-60 n = 15	>60 n = 10
Difficult urination	3	6	7	11	19
Nausea + pain	5	6	7	8	3
Vomiting + difficult urination	3	7	7	12	13
Pain + nausea + difficult urination	-	4	2	2	5
Total	11	23	23	33	40

From analyzing the subject's disease history it is noted that nearly 41 percent of the subject was not affected by any other disease before suffering from Urolithiasis. The remaining subject had other health disorder like nearly 5 percent suffered from diabetes, 18 percent suffered from hypertension, 13 percent suffered from urinary infection, and 13 percent from heat burns etc.

The symptom for this disease varied from patient to patient. Some common symptoms include difficulty in urination, pain, etc. Severe symptoms were found in patient above the age of 40 years. This disease is common for all age group but quite a larger in number in older age group.

The Kidney stone was found in all age category but larger in number of people above 50 years old. The disease occurrence pattern was noted in this order as ureteric > kidney> vesicle> bilateral.

From the study it is noted that the occurrence of Kidney stone and ureter calculi was high among the age group of 41 to 50 when compared to the age group of 20 to 30 years. Mainly patients are treated with flush therapy (43 %), while 27 % of them treated with surgery, and with ESWL (extra corporeal shock wave lithotripsy). Flush therapy was given to people of younger age group 20 to 30.

3.2 Health Habits of the Subjects

From the study it was found that many subjects involved in the study had the habit of smoking and chewing. It was found that 51 percent had smoking habit, 32 percent had drinking habit. Almost 74 percent of the subject had proper sleeping habits.

3.3 Somatic Status of the Subjects

The Somatic condition of the subject was tabulated in 2. The BMI (Body Mass Index), where Mid-Upper Arm Circumference denotes the protein level of the person, TSF denotes the thickness; Waist-hip-ratio (WHR) denotes the fat level of the person. From the study in it is found that almost 68 percent had normal BMI level. From the data of Mid-Upper Arm Circumference, MUAMC, and TSF shows that many have been subjected to malnutrition, this is due to the food intake of the individual is low when compared to people of normal condition.

Table 2: Somatic Status of the Subjects

Parameter	Age Group									
	20-30		31-40		41-50		51-60		>60	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Weight (kg)	58	+6.1	59	+5.2	58	+4.2	55	+3.3	45	+2.8
Height (cm)	166	+3.1	165	+2.6	166	+2.4	157	+3.2	168	+2.0
BMI	19	+2.6	21	+4.2	21	+3.1	21	+1.9	20	+3.1
Waist (cm)	70	+0.3	76	+0.8	77	+0.2	72	+0.8	71	+0.2
Hip (cm)	76	+0.6	84	+0.4	86	+0.01	85	+0.7	84	+0.06
WHR	0.8	+0.18	0.8	+0.05	0.9	+0.03	0.8	+0.12	0.8	+0.17
MUAC (mm)	84	+3.1	85+	+3.6	84	+2.3	78	+3.2	75	+2.8
TSF (mm)	71	+6.6	82	+7.7	82	+6.1	75	+8.0	71	+6.5
MUAMC (mm)	88	+5.2	87	+2.7	82	+4.3	86	+4.6	83	+4.12
Body fat (%)	9	+4.3	8	+4.1	8	+3.7	8	+2.1	7	+3.75

3.4 Clinical Report of the Subject

Clinical report of the subject has been tabulated in 3, which contains the details of hemoglobin level, creatinine, and urea of the subject. The mentioned parameters were found to be in normal condition.

Table 3: Bio- Chemical Profile of the Subjects

Parameter	Subjects	Normal values
Haemoglobin (g%) <910-12>12-14	2 26 102	12-14%
Creatinine (mg%) 0.7-0.91.0-1.4>1.4	28 87 15	1.0-1.4 mg/dl
Urea (mg%) <2526-40>40	20 100 10	Upto 40 mg/dl

From the study the hemoglobin level of the subject was found to be within normal range between 12 to 14 percent, only 20 percent people had hemoglobin below the normal level. Almost larger number of subject had creatinine and urea level within the normal range.

3.5 Dietary Plan and Intake Data of the Subject

The subject's food pattern has been discussed in detail in this section, the meal taken by the subject contains Wheat, Rice, and Roti etc. while staying in the hospitals the subjects had liquid food. Cereals were one of the most important ingredients of their daily food menu. Consumption of cereals Ragi, Rice, Wheat, etc. Consumption of pulse by the subject is at 57 percent, grams consumption level of the subject is at 76 percent.

Milk was either directly consumed or in form of tea or coffee by the subject. Almost 70 percent of them used Buffalo milk, 26 percent used cow milk. 50 percent people acquired milk lesser than half liter.

From the study it is found that 45 percent utilized mustard oil, 35 percent utilized mixed oil, some of them even utilized gingelly oil for cooking.

The subject consumed lesser quantity of fruits in their food habit, only 14 percent of fruit consumption was noted.

The food pattern of the subject was mostly filled with cereals, and they all consumed a very lesser quantity of protective food (green leafy fruits/ vegetables, citrus foods, meat, milk, eggs, etc).

Frequently consumed foods by the subject includes Wheat was consumed at the rate of 93 percent, horse gram consumed at the rate of 43 percent, weekly once or twice they consumed green leafy vegetables/fruits, and other pulses.

From the study, it was found that nearly 75 percent of subjects consume non-vegetarian foods like fish, meat, egg, etc. It is observed that the subject consumes a larger quantity of non-vegetarian foods. From the population, almost 80 percent of the subject is found to be non-vegetarian.

[18] From the food they consume Wheat and Horsegram are the food rich in oxalates and phytates. Food intake habit of the subject is tabulated in 4.

From food consumption pattern of the subject it is found that cereals are significantly consumed by them, then pulses, and vegetables. From the analysis the food that contains cereals and pulses were energy efficient and satisfactory it was compared with the DDP (the desired dietary pattern). The subject's intake lesser quantity of leafy green vegetables/fruits.

Table 4: Mean Food Intake Data of the Subjects

Parameter	Age Group											
	20-30		31-40		41-50		51-60		>60			
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Total	DDP*
Cereals (g)	425	56	430	51	410	49	415	47	420	49	415	600
Pulses (g)	58	8	60	9	61	7.6	60	806	62	9	60	60
Green leafy vegetables (g)	13	4	15	7.8	20	14	20	16	10	3.2	60	100
Other vegetables	65	9	70	8.1	85	13	65	8.7	17	9.7	70	100
Roots & tubers	76	9.6	65	9.7	90	12.6	60	8.5	55	9.2	65	80
Milk & milk products	95	14	85	13	85	9.3	95	14.8	65	11.4	85	200
Sugar/jaggery (g)	14	5	12	6.1	20	12.1	15	5.5	15	6.7	15	30
Fats & oils (g)	12	3	12	3.01	15	6.4	15	7.2	20	6.2	13	40
Non-vegetarian foods (meat, fish, egg)	430	56	435	52	415	50	415	49	425	50	435	605
Fruits (g)	10	2.8	10	5	10	3.9	30	15	15	4	15	100

*–For manual agricultural laborers (Total – 3790 kcal) – recommended by ICMR (Indian Council of Medical Research)

The daily intake of nutrients of the subject tabulated in 5. From the tabulation it is noted that the higher energy foods were consumed among the age group of 20 to 30, 31 to 40 years old. But the energy consumption by the subject is low when compared with DDP. The protein intake food was sufficient for older age group of subject between 60-63. When compared to other components the intake of nutrients and energy by the subject is adequate.

Table 5: Daily Intake of Major Nutrients among Subjects

Nutrients	Age Groups				DDP *
	20-30 Yrs	31-40 Yrs	41-50 Yrs	51-60 Yrs	
Energy (K cals)	1290± 40	1240±31.01	1250±25	1390± 19.1	3788
Protein (g)	30±3.8	25±2.17	25±1.18	30 ± 3.6	60
Carbohydrate (g)	225±13.1	210±11.1	215±10.1	220 ± 9.13	600
Fat (g)	30±3.17	25±2.8	35±2.18	30 ± 2.18	45
Dietary Fibre (g)	30±3.60	35±2.71	40±2.71	33 ± 3.4	-

*DDP- desirable dietary pattern, Values are mean of RDA computed according to occupation (for heavy physical activity) using ICMR data.

The consumption of iron and thiamine by the subject was found be in-adequate. The calcium intake is obtained through ragi. The food intake by the subject met with the needs of Reference Daily Intake (RDI), the intake of protein, calcium, and vitamin- C was sufficient but in-adequate when compared to the calories, Iron, and B-complex Vitamins. Those who involved in heavy physical activity the energy allocation of adult men was 60 Kcal /kg.

In this study population, actual intake was lower compared to recommended energy. The estimated mean energy expenditure of the subjects, particularly those engaged in heavy activities such as farmers, Coolies, Workshop men was 3717 kcal which was higher than the mean energy intake of 2638 kcal. It is evident that energy expenditure exceeds the actual energy intake by nearly 1000 Kcal. It clearly indicates that the energy expended by these subjects was more in case of farmers (85%) than in others.

After completing the survey, it was found that following were the main food of the people/patients that they commonly include in their diets.

1) Animal Protein: Beef, pork, goat, chicken and eggs.
2) Cereals like rice and wheat.
3) Local available fish like rohu, katla, Rui fish, mangur, small fish, prawn etc.
4) Local available vegetables like spinach, tomato, onion, potato, sweet potato, cauliflower, beet etc.
5) They loved excessive use of tomato as vegetable and salad.
6) Most of them were very fond of tea and generally included four cups a day.
7) Young people loved fast foods, aerated drinks, Fruit juice and sugary drinks.
8) Few people also consumed alcohol.
9) Milk consumed almost every day.
10) Besides above main foods people also loved adding a pinch of extra salt to their food.

4. Discussion

From this study some interesting facts were known. The Urolithiasis stone was quite common for men who belong to low-economic status. From the subject most people are involved with high physical activity in work like farming, daily wagers, people working in workshop, etc. Urolithiasis is caused because of several internal and external factors. From the internal factor age and gender of the subject were considered to be the important one. From this study it is found that subject with age group of 20 to 40 are highly affected with this disease, with the similar age group reported from Kishanganj district in Bihar.

Regular use of animal protein decreases the level of citrate in urine and increases the level of phosphorous, which causes calcium phosphate stones formation. Animal protein and some juices like sugarcane juice also make urine alkaline and favors calcium phosphate stone formation. Tomato, spinach, beet, sweet potato, baked potato, cauliflower, tea, etc are rich in oxalic acid and accelerate calcium oxalate crystals formation. Increased amount of calcium in urine, may lead to the formation of stones in Kidney. Alcohol and too much tea consumption increase the level of uric acid and cause uric acid stone formation. The extra consumption of salt sends more sodium to kidney which leads to less absorption of Ca by the kidney.

Besides these findings hardness of water is another cause for kidney stone disease in this region. As the Hard water

contains Calcium it combines with oxalate and phosphate that enters with food and forms more kidney stones.

[1, 4] Increased exposure to Sunlight, the dietary supplement can supply vitamin D_3, maximizes calcium absorption. The intake of water by the subject was found to be normal range. Those who involved with farming must consume more quantity of water, water may also be the greater prevalence of Stone disease. From the study it was found that bore-wells were the water supply source for the people.

[1, 3-4] From the study it is noted that people from specific region was subjected to this stone disease, thus includes some risky factors with regard to over saturation with salt.

5. Conclusion

From this research it is found that Urolithiasis is a common disease for nearly 10 percentage of population, connected to high morbidity (amount of disease within population), and cost. From this study it is observed that the emergence of the disease has increased in the past few decades. Urolithiasis is a disease which involves due to multiple factors like epidemiological, biochemical and genetic factors. The occurrence of this disease is based on the geographical area, financial condition, and dietary plans, etc. Our finding shows that eating certain food accelerates the formation of kidney stone formation. Common food practice among the population of this region is one of the major factors for frequent kidney stone disease occurrence in this region. Hope our work would be helpful to the doctors to assess the disease. As well as to the population to manage or prevent the disease by limiting the consumption of these foods in their diet.

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