



STUDY OF RENAL CALCULI CORRELATES WITH VARIOUS FACTORS

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ABSTRACT

Introduction : Renal colic is one of the common conditions in routine clinical practice now days. Kidney stones are one of the most common urological problems worldwide. The major risk factor for developing stones are hot climate, poor fluid intake, high animal protein diet and low calcium rich diet. Kidney stones are affecting almost all geographical, cultural and racial groups. Objective is to study various correlates of Renal Calculi in this part of the country.

Methods: Case sheets of 100 patients were selected which were proven cases of Renal Calculi during a period of 6 months July 2019 to Dec 2019. Subjects included both the genders, all age groups including pediatric and geriatric age group and all classes of socio economic strata. This Retrospective study involved Prior Consent from Hospital Authorities / Medical Superintendent of the tertiary care hospitals to see the records of the patients & were found within ethical standards. Patients admitted in the various Randomly selected surgical units of tertiary care hospitals in Randomly selected districts of CG as diagnosed cases of Renal Calculi were included in this study. Patients underwent standard clinical examinations, routine biochemical and haematological investigations

Results: Assessment of these selected patients was done in both IPD and OPD basis. The most prevalent age group are 26-50 years of 37% had renal calculi and males predominated over female has 61% vs. 39%. In the study there is significant prevalence of renal calculi which is 90% due to poor fluid intake and about 46% in patients who had history of gout. Analysis between serum uric acid and gender was significant and out of raised serum uric acid patients 44% were male and 26% were female. Out of the patients who had raised serum uric acid level 53% had larger calculi (> 6mm). Among males 61% were alcoholic. Out of alcoholic 52% had history of gout and 64% had high serum uric acid level both had significant value in study. Analysis between past history of renal calculi and history of gout had positive correlation and history of drug had negative correlation.

Conclusion: Factors like diet and life style plays an important role in the changing epidemiology of kidney stone. Changes in two of most important environmental factors, diet and climate, are the significant impact on these trends. Patients who had raised serum calcium and serum uric acid level had larger and multiple calculi bilaterally. There is strong evidence that diminished fluid and dietary calcium consumption is risk factor and increase in animal protein intake has an equal impact on kidney stone risk. Kidney stone is higher in warm or hot climates, scanty fluid intake and low urine output. Co morbidity in particular Type II Diabetes mellitus may be a major factor in the development of stone.

KEYWORDS : Renal Colic, Kidney Stones, Correlates, Risk Factors

INTRODUCTION

Renal colic is one of the common conditions in routine clinical practice now days. Kidney stones are one of the most common urological problems worldwide. The overall prevalence of developing kidney stone differs in various parts of world. There is various data showed that the prevalence of kidney stone increasing day by day in industrialized world. Higher ratios of kidney stones are in males relative to females. The major risk factor for developing stones are hot climate, poor fluid intake, high animal protein diet and low calcium rich diet. Kidney stones are affecting almost all geographical, cultural and racial groups. The high prevalence approximates 20 to 25% in the Middle East. There is increased risk of dehydration in hot or warm climates, a diet 50% in lower calcium compare to western diets, account for the higher risk of developing stones in the Middle East.[1]

In developed country there is very rapid increase over last 30 years.[2] The incidence of renal calculi is highest in Caucasian males.[3] Peak age between 40 to 60 years (approx 3 per 100 per year).[4] Epidemiologically, between 120 and 140 per 1000,000 will develop urinary stones each year with a male/female ratio of 3:1. In India the incidence and prevalence of kidney stones disease are higher in northern region compared to that in southern states.[5] Kidney stones are the most common cause of acute renal failure and chronic renal failure with estimated prevalence (20%), and there is a study of renal stone of 176 patients with the peak age group of 38.7 years, and renal stone were most common in Kochi, Kerala.[6] Diet, fluid and hot or warm climates have been

thought to play a major risk to development of kidney stone disease.[7] In general, the belief is that India is a land of stones.[8]

Most of these stone compositions are made up of calcium, oxalate and phosphates. The etiological and pathogenesis of kidney stone disease are debatable; however it is well known that drinking less water is a major risk factor for stone disease. New research by the National Kidney foundation suggests that the Nano bacteria may be the culprit. These findings are very useful and may eventually lead to new and more effective ways of treating and preventing kidney stone disease [9]. A Study on spectrum of kidney stone composition in India revealed that 93.4% were calcium oxalate stones, 1.2% having struvite, 1.80% apatite, 0.95% uric acid and 2.76% were mixed. Around 50-70% of these patients may develop a second stone if followed up to 10 years after the first episode.[10] Urinary stone constitute one of the commonest diseases in our country. In India, approximately 5-7 million populations suffer from stone disease and at least 7-10 by 1000 of Indian population needs hospitalization due to kidney stone.[11] From some experimental data, the higher prevalence of kidney stone in males can be probably due to the effect of sex hormones on lithogenic risk factors: androgen appeared to be increased, and oestrogen appeared to be decreased.[12] Peak age of recurrence of idiopathic kidney stone is approx 35 years.[13] This indicates that hospital admission data for kidney stone disease reflects morbidity more than true prevalence.[14] A familial occurrence has been suggested for hypercalciuria which is the main risk factors for idiopathic kidney stone

disease.[15] It has been proposed that comorbidity with essential hypertension, over weight and Type 2 Diabetes Mellitus predispose to kidney stone disease. Few lithogenic risk factors like urinary calcium, oxalate and uric acid excretion, are known to be influenced by rich animal protein diet, which in turn is frequently related to overweight. In female patient with basal metabolic index (BMI), 40% higher than standard, there was a (89%) increase in the prevalence of kidney stone, while corresponding figures in males was only (19%).[16] In hypertensive patients, with two to five fold increase in relative risk of kidney stone. Higher risk may be due to coexistence of risk factors for both the diseases, namely over weight and high animal protein, salt intake.[17-19] There has been much evidences of dietary factors closely related to the prevalence of stone disease in a given populations is probably due to high animal protein consumption.[20] Drugs that may increases the risk of stone disease.[21] Decongestants : ephedrine, guaifensin Diuretics : triamterene Protease inhibitors : indinavir Anticonvulsants : felbamate , topiramate and zonisamide

Approximately 80% of kidney stones are calcium oxalate (CaOx),[22] with a small percentage (15%) of calcium phosphate (CaP).[23] 'Red flag' sign warranting further investigation.[24] Episodes of first stone under the age of 25 Bilateral or multiple renal stones, or nephrocalcinosis Recurrent kidney stones Renal stones associated with impaired renal function(eGFR less than 60ml/min/1.732m²)

General measures to prevent recurrent stone formation are - Increase fluid intake is advised to maintain the urine output of 2-3l/day.[25]

Decrease the intake of animal protein (30 mmol/day).[26] Cranberry juice: decrease incidence.[27]

METHODOLOGY

This Retrospective study involved Prior Consent from Hospital Authorities / Medical Superintendent of the tertiary care hospitals to see the records of the patients & were found within ethical standards. Patients admitted in the various Randomly selected surgical units of tertiary care hospitals in Randomly selected districts of CG as diagnosed cases of Renal Calculi were included in this study.

Case sheets of 100 patients were selected which were proven cases of Renal Calculi during a period of 6 months July 2019 to Dec 2019. Subjects included both the genders , all age groups including pediatric and geriatric age group and all classes of socio economic strata.

Patients underwent standard clinical examinations, routine biochemical and haematological investigations, Ultrasonography of whole abdomen and received treatment as decided by their treating physician and surgeon. Medical record numbers were used to generate the data for analysis. The principle of calcium estimation was by using Randox imola as it specially binds to calcium forming a coloured compound. Ca⁺⁺ plus Arsenazo III coloured complex. The Randox imola 3 uses a timed endpoint method to measure the concentration of uric acid in serum, plasma.

The data were analyzed by IBM SPSS Statistics 23. The differences in the variables were determined by the Chi-Squared test and Fisher's exact test between classic and preperitoneal methods. Overall, $p < 0.05$ was proposed to represent statistical significance after correction.

RESULTS

Assessment of these selected patients was done in both IPD and OPD basis. The most prevalent age group are 26-50 years of 37% had renal calculi and males predominated over female

has 61% vs. 39%. In the study there is significant prevalence of renal calculi which is 90% due to poor fluid intake and about 46% in patients who had history of gout. Out of 100 renal calculi patients 43% had high serum calcium (> 10.4 mg/dl) and 53% had high serum uric acid level (>5.7mg %). Among individual with high serum calcium and uric acid level had multiple bilateral large size of kidney stones. Among total of 100 patients 34% had past history of calculi, 41% had family history of calculi

Out of 100 patients 27% had multiple calculi, 23% had bilateral calculi and 50% had large calculi (> 6mm). In study of total kidney calculi patients 41% had significant pus cell and 28% had RBC in urine. Among males 44% and among females 49% had raised serum calcium level. Out of the patients who had raised serum calcium 38% had larger calculi. Out of patients who had past history of renal calculi , 38% had large size of calculi (>6mm) and 42% had high serum calcium level. Analysis between serum uric acid and gender was significant and out of raised serum uric acid patients 44% were male and 26% were female. Out of the patients who had raised serum uric acid level 53% had larger calculi (> 6mm). Among males 61% were alcoholic. Out of alcoholic 52% had history of gout and 64% had high serum uric acid level both had significant value in study. Analysis between past history of renal calculi and history of gout had positive correlation and history of drug had negative correlation. Individuals with history of gout 46% had large size of calculi. Analysis of family history of calculi with history of gout and with size of calculi was significant. Out of 100 patient 52 had less than 2 days of hospital stay, and patient with co morbidity like type 2 DM, hypertension and obesity have longer stay in hospital.

DISCUSSION

This was an observational study with the main objective of serum calcium and serum uric acid level in individual with kidney stone in renal colic, with a focus on various risk factors for prevalence of stone disease. Assessment of these selected patients was done in both IPD and OPD basis. The most prevalent age group are 26-50 years of 37% had renal calculi and males predominated over female has 61% vs. 39%. In the study there is significant prevalence of renal calculi which is 90% due to poor fluid intake and about 46% in patients who had history of gout. Out of 100 renal calculi patients 43% had high serum calcium (> 10.4 mg/dl) and 53% had high serum uric acid level (>5.7mg %). Among individual with high serum calcium and uric acid level had multiple bilateral large size of kidney stones. Among total of 100 patients 34% had past history of calculi, 41% had family history of calculi

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with co morbidity like type 2 DM, hypertension and obesity have longer stay in hospital.

These observations were confirmed by many others.[28]. The prevalence of kidney stones was 8.8% (95% confidence interval [CI], 8.1–9.5). Among men, the prevalence of stones was 10.6% (95% CI, 9.4–11.9), compared with 7.1% (95% CI, 6.4–7.8) among women [29]. individual with renal stone has more chance of raised serum calcium level and large calculi.

Study on metabolic risk factors Kidney stones were more common among obese than normal-weight individuals Obesity and diabetes were strongly associated with a history of kidney stones in multivariable models.[29] And one more study a report from American Journal of Kidney Diseases shows that kidney stones are associated with metabolic syndrome.

It was observed that the intake of animal protein was high with less consumption of leafy vegetable therefore unfortunately less consuming of calcium in diet, and this plays an important role for developing kidney stone in this reason. There are various researcher mentioned in study of 864 cases of kidney stones were documented. After adjustment for potential risk factor, intake of dietary calcium was inversely associated with risk for kidney stones.[30]

Recommendations –

High fluid intake (>2.5 litre/day) and vegetarian diet are widely agreed recommendation to reduce the recurrence of kidney stone and prolong the average interval for recurrence.

Recommendations for analgesia during renal colic First choice: start with an NSAID, e.g. diclofenac, ibuprofen. Second choice: hydro morphine, pentazocine or tramadol. To reduce the rate of recurrent renal colic by use ablockers In patients newly diagnosed with renal stones < 10 mm, and if active removal is not indicated, observation with periodic evaluation is an optional initial treatment. Such patients may be addressed with appropriate medical therapy to facilitate stone passage during observation.

Physicians should evaluate the need for urgent intervention and the likelihood for passage of stones, as some small stones do pass spontaneously. Metabolic risk factor for kidney stones should be addressed in recurrences cases, and also in some individual presenting for the 1st time.

More cohort studies with large population should be done to prevent recurrent kidney stone disease.

CONCLUSION

The results of the present study may give a snapshot of current worldwide trend . The present study demonstrates that there has been an increase in the prevalence and incidence of kidney stone in south India and other parts of world. Many aspects of the mechanism of renal stone formation remain unclear at present. Factors like diet and life style plays an important role in the changing epidemiology of kidney stone. Changes in two of most important environmental factors, diet and climate, are the significant impact on these trends. Patients who had raised serum calcium and serum uric acid level had larger and multiple calculi bilaterally. There is strong evidence that diminished fluid and dietary calcium consumption is risk factor and increase in animal protein intake has an equal impact on kidney stone risk. Kidney stone is higher in warm or hot climates, scanty fluid intake and low urine output. Co morbidity in particular Type II Diabetes mellitus may be a major factor in the development of stone. Our review demonstrated that there was a decrease in stone prevalence among older age group. The peak age groups of reoccurrence were 26-50 years and males predominance over

females. History of gout and alcohol is an important risk for the development of stone formation. The study suggests that the incidence and prevalence of kidney stone is increasing globally, these increase are seen across age, sex, and race.

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