



**INVESTIGATION OF FACTORS INFLUENCING UROLITHIASIS IN PATIENTS FROM NORTHERN METRO ZONE A CROSS SECTIONAL OBSERVATION STUDY**

**Maniraja Asai <sup>\*1</sup>, K.Sowmiya <sup>2</sup>, N.Anbu <sup>3</sup>**

<sup>\*1&2</sup> P.G Scholar, Department of Maruthuvam, Government Siddha Medical College, Arumbakkam, Chennai 600 106, Tamil Nadu, India.

<sup>3</sup> Head, Department of Maruthuvam, Government Siddha Medical College, Arumbakkam, Chennai 600 106, Tamil Nadu, India.

**ABSTRACT**

Urolithiasis or urinary stone, the presence of one or more calculi in the urinary tract, is a serious, debilitating problem worldwide. Globally, kidney stone disease prevalence and recurrence rates are increasing, with limited options of effective drugs. Urolithiasis affects about 12% of the world population at some stage in their lifetime. Urolithiasis needs both preventive and curative therapy because of having a higher rate of reoccurrences of kidney stone. The treatment modalities like surgery and drug therapy are practiced in the management of kidney stones but have some limitations. Traditional medicines and Indian medicines are becoming more and more popular as alternative and supplementary remedies over recent years because of its low cost and nontoxic nature. The main aim of the present observational study is to find out the influential factors that aggravates the urolithiasis in patients from northern zone of chennai, Tamil Nadu, India. Results of the study strongly it was observed that reoccurrence is more common in renal calculi, further from the survey it was observed that certain predominant factor that influence the chance of occurrence of stone are high salt intake, low water consumption, non-veg diets and highly protein consumption. It was concluded from the result analysis of the present observational study that diet have strong influence on pathogenesis of urolithiasis. Increased water intake and low salt consumption may reduce the progression. This data's will be highly beneficial for the researcher who pursue research in the similar field.

**KEY WORDS:** *Urolithiasis, Recurrence, Observational study, Salt intake, Water consumption, Diet*

*Corresponding Author: Maniraja Asai*

*Department of Maruthuvam, Government Siddha Medical College, Arumbakkam, Chennai 600 106, Tamil Nadu, India.*

*Email: asaimakeitsimple@gmail.com*

## 1. Introduction

Urolithiasis is a condition where there is a formation of stone in the urinary system, i.e in the kidney, ureter, urinary bladder or in the urethra [1]. Generally, there are five different types of stones of which calcium oxalate is the most common stone (80%), calcium phosphate stone (5%), magnesium ammonium phosphate, cistine and uric acid stone [2]. There are two varieties in calcium oxalate stone, i.e monohydrate type (in the form of dump bell or oval) and dihydrate type (in the form of double pyramid) [3]. The cause is multifactorial including diet, genetic and environmental [4].

Obesity and overweight are risk factors for stone formation [5]. The role of nutrition in formation of kidney stones was identified in adult population [6]. High-fiber and fruit diets may protect against the risk of stones [7]. Increased consumption of magnesium-containing foods (almonds and bananas) may be associated with reduced risk of stone formation [8]. Increased consumption of high-oxalate foods may significantly increase oxalate secretion, even in healthy individuals, without disturbing oxalate metabolism [9]. Consumption of animal protein (like egg white) reduces urinary pH and increases urinary uric acid, which are harmful agents for the formation of calcium and uric acid stones.

At present, no suitable drugs in modern medicine are available for the management of urolithiasis. Several therapies which include thiazide diuretic and alkali citrate are used for preventive therapy but no allopathic medicine available which can dissolve the stone. The other types such as surgical removal of stones, extracorporeal shock wave lithotripsy (ESWL), and percutaneous nephrolithotomy (PCNL) are being used for the management of stones. Moreover, these are less convincing and cause side effects such as hemorrhage, hypertension, tubular necrosis, and subsequently fibrosis of the kidney [10]. The current medical management of urolithiasis involves administration of symptomatic drugs like diuretics, alkanizers, anti-inflammatory etc., and other techniques like extracorporeal shock wave lithotripsy and percutaneous nephrolithotomy [11-13]. However, these treatment options have certain hurdles such as limited therapeutic outcome, comparatively high cost and chances of frequent recurrence [14]. The main

objective of the present observational study is to find out the influential factors that aggravates the condition of urolithiasis in patients from northern zone of chennai, Tamil Nadu, India.

## 2. Materials and Methods

### 2.1. Study design

Cross sectional observation study comprises of 30 patients with the complaint of urolithiasis was chosen for the individualized in-depth evaluation and subjected to survey on factors influencing urolithiasis in northern zone of Chennai, Tamil Nadu, India. The entire study was conducted on Out-patient department of Arignar Anna Government Hospital of Indian medicine, Chennai, Tamil Nadu, India. Institutional ethical committee clearance was obtained for this study [IEC approved no: GSMC-CH-ME-5/032/2018]. Participants were also explained that completion and submission of the questionnaire would be taken as consent to participate in this study. Data were dealt with the high level of anonymity and confidentiality.

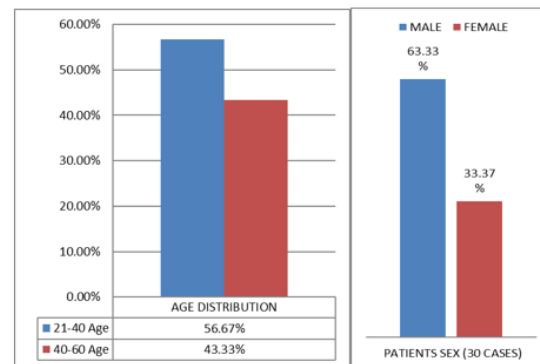
### 2.2. Questioner Pattern

The questionnaire was divided accordingly to cover the entire purpose of the study such as life style factors, diet, family history, diet etc.

## 3. Results

### 3.1. Age distribution and gender prevalence

From the results analysis of the present study it was observed that, out of 30 patients 56.67% occurs in 21-40 age groups and 43.33% occurs in 40-60 age groups.



**Figure 1: Age distribution and gender prevalence among the selected individuals**

### 3.2. Marital Status

From the results analysis of the present study it was observed that, out of thirty patients 27 were married (90%) and 3 were un married (10%).

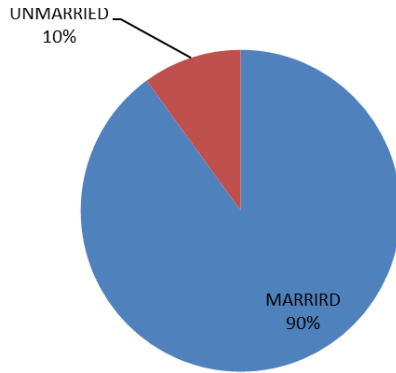


Figure 2: Martial status of the individuals subjected to the survey

**3.3. Measurement on Renal calculi**

From the results analysis of the present study it was observed that, out of 30 patients, 63% patients were less than 8 mm and 37% patients were more than 8 mm.

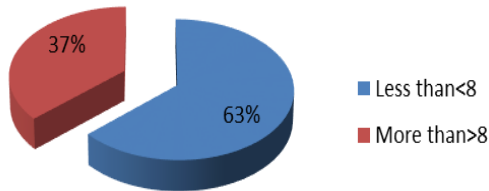


Figure 3: Measurement on Renal calculi of the individuals subjected to the survey

**3.4. Index of Reoccurrence of Renal calculi**

From the results analysis of the present study it was observed that, out of 30 patients, 27 patients were reported with less than 5 times (90.01%) and 3 patients were more than 5 times (9.99%).

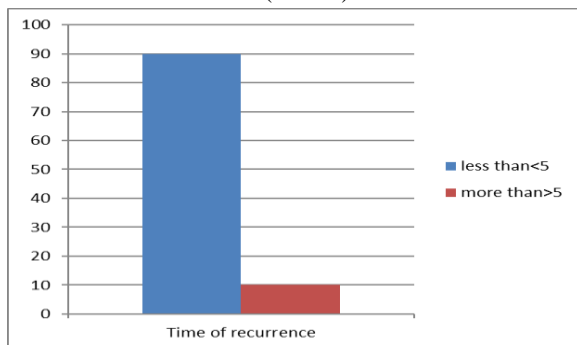


Figure 4: Index of Reoccurrence of Renal calculi

**3.5. Source of water consumption**

From the results analysis of the present study it was observed that, out of 30 patients, 18 patients had mineral water (60%), 6 patients had metro water (20%) and 6 patients had bore well water (20%).

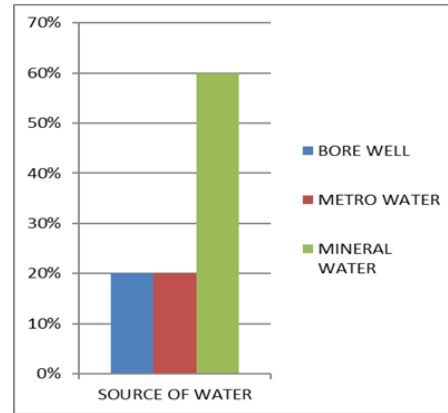


Figure 5: Source of water consumption

**3.6. Limit of Salt consumption**

Out of 30 patients 43.33% of them had high salt intake in diet, 40% of them had moderate salt intake and 16.67% of them had low salt intake

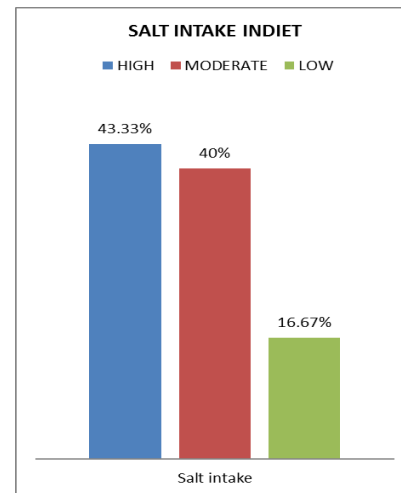


Figure 6: Limit of Salt consumption

**3.7. Limit of water consumption**

From the survey it was observed that, out of 30 patients, 57% had less than 2 liters and 43% had more than 2 liters.

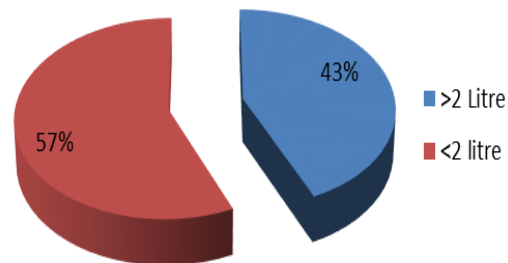


Figure 7: Limit of water consumption

### 3.8. Dietary Preference

From the survey it was observed that out of 30 patients, 28 patients had non veg & veg food habit (93.33%) and 2 patients had veg food habit (6.67%).

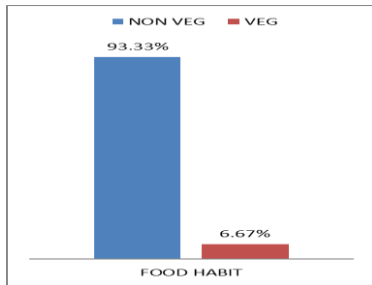


Figure 8: Preference towards diet

### 3.9. Familial Existence, Prior treatment, Secondary complications and Smoking habituation

Out of 30 patients, 6 patients had family history of stones (20%) and 24 patients had not taken family history of stones (80%). Out of 30 patients, 11 patients had taken AYUSH Medicine (36.33%) and 19 patients had not taken AYUSH Medicine (63.33%). Out of 30 patients, 3 patients had other disease complication (10%) and 27 patients had no other disease complication (90%). Out of 30 patients, 5 patients had Smoking habit (16.67%) and 25 patients had no Smoking habit (83.33%)

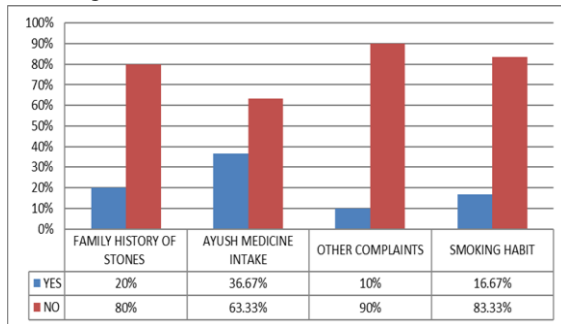


Figure 9: Demography on Familial Existence, Prior treatment, Secondary complications and Smoking habituation

### 3.10. Dietary Pattern of vegetarian diet consumers

It was observed that out of 30 patients, 3 patients had taken roti in daily (10%), 8 patients had taken in weekly (>3 times) (26.67%), 6 patients had taken in monthly (>3 times) (20%), 13 patients had taken in rarely (43.33%). Out of 30 patients, 1 patient had taken cabbage in daily (3.33%), 10 patients had taken in weekly (>3 times) (33%), 11 patients had taken in weekly (>3 times) (36.67%), 8 patients had taken in rarely (26.67%). Out of 30 patients, 1 patient had taken greens in daily (3.33%), 13 patients had taken in

weekly (43.33%), 6 patients had taken in monthly (>3 times) (20%), 8 patients had taken in rarely (26.67%). Out of 30 patients, 1 patient had taken banana stem in daily (3.33%), 9 patients had taken banana stem in weekly (>3 times) (30%), 6 patients had taken in monthly (>3 times) (20%), 14 patients had taken in rarely (46.67%).

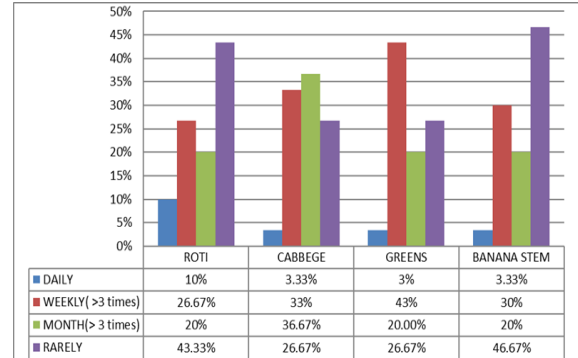


Figure 10: Dietary Pattern of vegetarian diet consumers

### 3.11. Dietary Pattern of Non-vegetarian diet consumers

From the results it was observed that out of 30 patients, 22 patients had taken milk in daily (73.33%), 2 patients had taken in weekly (>3 times) (6.67%), 6 patients had taken in rarely (20%). Out of 30 patients, 6 patients had taken curd in daily (20%), 10 patients had taken in weekly (>3 times) (33%), 6 patients had taken in monthly (>3 times) (20%), 8 patients had taken in rarely (26.67%). Out of 30 patients, 2 patients had taken fish in daily (6.67%), 13 patients had taken in weekly (43.33%), 10 patients had taken in monthly (>3 times) (33.33%), 3 patients had taken in rarely (10%). Out of 30 patients, 3 patients had taken chicken in daily (10%), 17 patients had taken in weekly (>3 times) (56.67%), 6 patients had taken in monthly (>3 times) (20%), 2 patients had taken in rarely (6.67%).

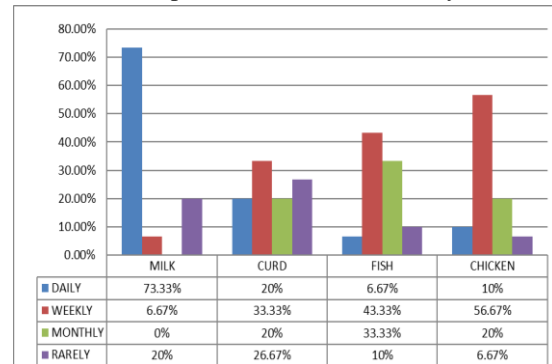


Figure 11: Dietary Pattern of Non-vegetarian diet consumers

#### 4. Discussion

Urolithiasis is the presence of calculi in the kidney and/or in any part of the urinary tract, including the ureters and bladder. Nearly about 80% of these calculi are composed of calcium oxalate and phosphate [15]. The recurrence rate of urolithiasis without any precaution or preventive treatment is approximately 10% per year [16]. Epidemiological studies revealed that the urolithiasis is more prone to men (12%) than women (6%) and is more prevailing with increasing ages between 20 and 40 in both men and women [17]. Urolithiasis is a multifaceted process which includes crystal nucleation, aggregation, and growth of insoluble particles [18].

Recurrent stone formation is also associated with risk of renal damage. Extracorporeal shock wave lithotripsy is widely used for treatment of urolithiasis. Its multiple sessions in recurrent stone formation may cause chronic deterioration of renal function [19]. Currently, there is no established treatment for prevention of urolithiasis. Therefore, there is need to establish a medical treatment for prevention of recurrent stone formation. In the present study it was observed that, out of 30 patients, 27 patients were reported with less than 5 times (90.01%) and 3 patients were more than 5 times (9.99%). Increased animal-protein consumption has been considered risk-factor for urolithiasis for a number of years. The evidence is mostly indirect and observed in epidemiological surveys [20]. A number of lithogenic metabolic changes are induced by increased protein consumption, most notably increased calciuria, uricosuria and decreased citraturia and pH; effect on oxaluria is variable. From the results it was observed that out of 30 patients, 22 patients had taken milk in daily (73.33%), 2 patients had taken in weekly (>3 times) (6.67%), 6 patients had taken in rarely (20%). Out of 30 patients, 6 patients had taken curd in daily (20%), 10 patients had taken in weekly (>3 times) (33%), 6 patients had taken in monthly (>3 times) (20%), 8 patients had taken in rarely (26.67%). Out of 30 patients, 2 patients had taken fish in daily (6.67%), 13 patients had taken in weekly (43.33%), 10 patients had taken in monthly (>3 times) (33.33%), 3 patients had taken in rarely (10%). Out of 30 patients, 3 patients had taken chicken in daily (10%), 17 patients had taken in weekly (>3 times) (56.67%), 6 patients

had taken in monthly (>3 times) (20%), 2 patients had taken in rarely (6.67%).

Recent studies associate drinking water with sympathetic stimulation, which increases the metabolic rate (thermogenesis) and augment daily energy expenditure [21]. Nevertheless, drinking plenty of water is universally recommended. From the results analysis of the present study it was observed that, out of 30 patients, 18 patients had mineral water (60%), 6 patients had metro water (20%) and 6 patients had bore-well water (20%). From the survey it was further observed that, out of 30 patients, 57% had less than 2 liters and 43% had more than 2 liters.

Dietary causes may also generate increased risks of various stones. High sodium intake increases urinary calcium excretion. High protein diets (> 2.0 g/kg/d) can increase urinary calcium, decrease urine pH and also increase urinary uric acid level [14]. In the present study out of 30 patients 43.33% of them had high salt intake in diet, 40% of them had moderate salt intake and 16.67% of them had low salt intake. Further it was observed that out of 30 patients, 28 patients had non veg & veg food habit (93.33%) and 2 patients had veg food habit (6.67%). There is also evidence of reduced proximal tubular reabsorption of sodium and calcium in patients with idiopathic hypercalciuria, which leads to a negative calcium balance [23]. Low sodium diet may lower urinary calcium excretion by increasing reabsorption of calcium.

#### 5. Conclusion

Renal calculi are common and an extremely painful condition with recurrence rate 70-81% and 47-60% in male and female, respectively. Results of the present observational study strongly it was observed that reoccurrence is more common in renal calculi, further from the survey it was observed that certain predominant factor that influence the chance of occurrence of stone are high salt intake, low water consumption, non-veg diets and highly protein consumption. It was concluded from the observation that patients with urolithiasis may focus more on reducing the consumption of high protein food. Furthermore, despite several problems associated with the treatment of kidney stones, patients should be encouraged to improve their dietary habits, improve water consumption and reduce their salt intake.

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