Original Article

# Prevalence and Risk FactorsAssociated with Renal Calculi Disease at UHTC Catchment Area in Perambalur, Tamilnadu

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## ABSTRACT

**Aim:** A Renal Calculus is a hard mass developed from crystals that separate from the urine and build upon the inner surfaces of the kidney. In India, although few hospital-based studies offer some information on techniques used in detection and treatment of renal calculi. Aims: 1. To find out the prevalence of self-reported renal calculi and 2. To study the risk factors associated with renal calculi in UHTC catchment area of Dhanalaxmi Srinivasan Medical College, Perambalur.

**Materials and Methods :** A community based cross-sectional study was performed among people residing in Urban Health Training center area of DSMCH, Perambalur during March to May 2013. The study subjects were selected by multi-stage sampling technique and data was collected on predesigned questionnaire by personal interview. Appropriate Statistical tests were applied for analysis.

**Statistical Analysis:** The statistical analysis was done by statistical software from www.OpenEpi.com by applying various statistical tests.

**Results:** Out of 566 houses, we could obtain information for 378.75 (66.9%) houses, total number of individuals studied being 1515. The mean age of the individuals was 32.89 (+ 18.05 SD) years. The lifetime prevalence of self-reported 'Renal Calculi Disease' was found out to be 1.78 percent. Out of 27 cases, all of them had a complaint of pain from lion to groin, 24 (88.89%) cases had a complaint of burning micturation, 6 (22.22%) cases had blood in their urine, 14 (51.85%) cases had a complaint of stoppage of mid-stream urine and 8 (29.62%) had a complaint of granules in urine.

**Conclusion:** the over-all prevalence of renal calculi was found to be low among study subjects.

**Keywords:** Renal calculi, urban area, groin pain.

## INTRODUCTION

A Renal Calculus is a hard mass developed from crystals that separate from the urine and build upon the inner surfaces of the kidney.[1] It is a distressing chronic condition which is getting common and was found increasing in some parts of the World.[2] In India, although few hospital-based studies offer some information on techniques used in detection and treatment of renal calculi [3-2], the information regarding its prevalence in community settings and its distribution across various socio-demographic strata is lacking.

Dietary factors that increase the risk of stone formation include low fluid intake and high dietary intake of animal protein, sodium, refined sugars, fructose and high fructose corn syrup [4] oxalate [5]. Some studies suggest people who take supplemental calcium have a higher risk of developing kidney stones and these findings have been used as the basis for setting the recommended daily intake for calcium in adults. [6]

Social mapping exercise was done as a part of health needs assessment required for planning of our teaching, research and provision of health services in Urban Health Training Center (UHTC) catchment area of Dhanlaxmi Srinivasan Medical College, Perambalur. During this exercise Renal Calculi was found as a common health problem. Hence, the present study was done to find out the prevalence of self-reported renal calculi and risk factors associated with Renal Calculi Disease.

## MATERIALS AND METHODS

**Study type:** The present study is cross sectional community based study.

**Sample size:** The estimated prevalence of renal calculi disease is 15%.[1,2] At 5% risk and with 10% allowable error, calculated sample size is 2267.

**Sampling technique:** Multi-stage sampling technique was done in the present study. Stage 1-population of UHTC catchment area is 14,632 of 2000 houses. Out of eight wards, two wards were selected randomly to perform the study. Stage 2- These wards have total 3500 household members comprising 700 houses. Every 5th house was selected by systemic random sampling method to cover 566 houses for required sample size of 2267.

**Study Area:** UHTC catchment area of Dhanalakshmi Srinivasan Medical College, Perambalur. Study period: March to May 2013.

**Statistical analysis:** The statistical analysis was done by statistical software from www.OpenEpi.com by applying various statistical tests.

### Study procedure

The present cross sectional study had undertaken in two wards 12 and 14. The investigators had paid house to house visit. After obtaining the informed written consent, data was collected on the pre-designed questionnaire, which is based on the existing literature on renal calculi.

Apart from background information, individuals were asked about the ever diagnosed case of renal calculi, presence of symptoms of renal stone in lifetime, status of its diagnosis, duration and sources of treatment. We enquired for five complaints related to renal stones - Pain from loin to groin, burning mictuirition, blood in urine, urine stoppage in mid-stream and granules in urine. The combination of any of the above two symptoms indicates the presence of renal calculi.[2] We also obtained frequency of commonly consumed calcium and oxalate rich local food items in last week preceding the survey.

In the present study, the term prevalence of renal stone referred to the proportion of persons in the population

**Table no. 1.** Prevalence of renal calculi in UHTC catchment area in Perambalur (n=1515)

| Characteristics of individuals | | Individuals with Renal calculi | Individuals without Renalcalculi | Total individuals | Prevalence |
|---|---|---|---|---|---|
| **Total** | | **27** | **1488** | **1515** | **1.78** |
| Age | Below 18 | 1 | 340 | 341 | 0.29 |
| | 18 to 45 | 11 | 797 | 808 | 1.36 |
| | 46 to 60 | 9 | 252 | 261 | 3.45 |
| | Above 60 | 6 | 99 | 103 | 6.06 |
| Sex | Male | 19 | 763 | 782 | 2.43 |
| | Females | 8 | 725 | 733 | 1.09 |
| Religion | Hindu | 27 | 1405 | 1432 | 1.89 |
| | Muslim | 0 | 27 | 27 | 0 |
| | Christian | 0 | 56 | 56 | 0 |
| Education | Illiterate | 3 | 216 | 219 | 1.37 |
| | Primary | 0 | 181 | 181 | 0 |
| | Middle | 7 | 283 | 290 | 2.41 |
| | Secondary | 8 | 332 | 340 | 2.36 |
| | Graduation | 9 | 476 | 485 | 1.86 |
| Occupation | Agriculture related | 3 | 56 | 59 | 5.08 |
| | Business | 5 | 192 | 197 | 2.54 |
| | Dailywedge laborer | 6 | 149 | 155 | 3.87 |
| | Housewife | 4 | 314 | 318 | 1.26 |
| | Services | 6 | 213 | 219 | 2.74 |
| | Unemployed | 3 | 565 | 568 | 0.53 |

**Table no.2** Description of Renal calculi Disease in UHTC catchment area in Perambalur (n=27)

| S.No. | Description of Renal calculi Disease | Number (%) |
|---|---|---|
| 1 | Family history of renal calculi | 17 (62.96) |
| 2 | Ever diagnosed case of renal calculi | 21(77.78) |
| 3 | Average Age of onset of calculi | 43+14.24 (Median+SD) |
| 4 | Average Age of diagnosis | 43 +14.82 (Median+SD) |
| 5 | Taken any medication for calculi | 25 (92.59) |
| 6 | Operated for calculi | 9(33.33) |
| 7 | Currently having symptoms of renal stones | 17 (62.96) |
| 8 | Death due to renal calculi | 1(3.70%) |

(Figures in parenthesis are percentages)

who has one or more clinically confirmed episodes of renal stone. Where ever possible, the investigator confirmed the diagnosis from the investigation papers of the patients and doing respective investigations. Those houses which remain closed even after three visits and refused to consent were excluded from the study.

**Table 3:** Presence of symptoms related to renal calculi in UHTC catchment area in Perambalur

| Symptoms related to renal calculi | With renal calculi (n=27) | Without renal calculi (n=1488) |
|---|---|---|
| Pain from loin to groin | 27 (100) | 31 (2.08) |
| Burning micturation | 24 (88.89) | 22 (1.48) |
| Blood in urine | 6 (22.22) | 1 (0.07) |
| Urine stops in mid-stream | 14 (51.85) | 5 (0.34) |
| Granules in urine | 8 (29.62) | 2 (0.13) |

(Figures in parenthesis are percentages)

**Table 4:** The frequency of commonly consumed calcium and oxalate rich local food items in UHTC catchment area in Perambalur

| Commonly consumed calcium and oxalate rich local food items | Food frequency in a week (Median) | |
|---|---|---|
| | With renal calculi (n=27) | Without renal calculi (n=1488) |
| Leafy vegetables | 2 | 2 |
| Soybean | - | 1 |
| Potatoes | 1 | 2 |
| Curd | 4 | 3 |
| Buttermilk | 2 | 2 |
| Milk | 7 | 7 |
| Milk tea | 14 | 14 |
| Bread | 7 | 4 |
| Fruit (calcium and oxalate) | 2 | 2 |
| Egg | 3 | 5 |
| Meat | 1 | 1 |
| Fish | 2 | 2 |
| Salt per day | 1 | 1 |

## RESULTS

Out of 566 houses, we could obtain information for 378.75 (66.9%) houses, total number of individuals studied being 1515. The mean age of the individuals was 32.89 (+ 18.05 SD) years. Out of 1515 individuals, 782 (51.61%) were male and 733 (48.38%) were females. About 219 (14.46%) individuals were illiterate, 181 (4.3%) individuals could study till primary standard, 290 (19.14%), 340 (22.44%), 485 (32.01%) individuals had education till middle class, secondary level and college / graduation level respectively (Table 1).

The lifetime prevalence of self-reported 'Renal Calculi Disease' was found out to be 1.78 percent. Among 27 cases, 9 (33.33%) were operated for the condition and 1(3.76%) individual died due to renal calculi. 17 (62.96%) individuals had a family history of renal stone. The average age of onset for renal stone was 43+14.24 SD years and average age of diagnosis was 43 +14.82 SD years. Currently 17 (62.96%) cases having symptoms of renal stones (Table 2).

These studies showed that majority of cases were in 18 to 45 years 11(40.74%) age group. Males cases 19 (70.37%) were higher than females 8 (29.63%). Most of the cases (61.3%) had above poverty line status. In the present study all cases were belonged to Hindu religion. Majority of the cases had education up to secondary 8 (29.63%) and graduation 9 (33.33%). Most of the cases had occupation of daily wage worker and services 6 (22.22%) each.(Table 1).

Out of 27 cases, all of them had a complaint of pain from lion to groin, 24 (88.89%) cases had a complaint of burning micturation, 6 (22.22%) cases had blood in their urine, 14 (51.85%) cases had a complaint of stoppage of mid-stream urine and 8 (29.62%) had a complaint of granules in urine. (Table 3).

The frequency of some commonly consumed calcium and oxalate rich local food items was similar among those who had renal stone and those who did not have renal calculi (Table 4).

## DISCUSSION

Overall, the lifetime prevalence of renal calculi among adults in the study area was 1.78 percent. At least two symptoms were present in 92.3% reported cases and 3.8% among others. A community-based study in coastal Gujarat found that 4.4% population had presence of at least two above mentioned symptoms and it was attributed to high water salinity.[1]

We found that majority males 19 (70.37%) were affected than females 8 (29.63%). This finding is similar to the study undergone by Soucie et al.[7] The morbidity of renal calculi lies in its recurrence which is 75% in a period of 20-30 years of follow up.[8-11] The average age of onset in our study was 43+14.24 SD years. We found that more cased were in economically active age group (18-45 years), educated and were having relatively sedentary occupation.

The food frequency of commonly consumed calcium and oxalate rich item was same among those who had renal calculi and those who did not have it. In a community-based study, Sowers et al did not find any association of increased dietary calcium consumption with presence of renal calculi.[12] However, in a study in coastal Gujarat, it is attributed to water salinity.[5]

The present study was a community-based study and descried the epidemiology of renal calculi and its symptoms. Since, it was small study on a feasible sample; its findings cannot be generalized. There could be recall bias while obtaining information from housewives. However, it can be used for sample size calculation and planning future community-based research in the local area.

Thus, the lifetime prevalence of renal calculi was 6.4 % among adult population in local community. It was high among men and literate population who are concurrently in economically active age group. Four percent of adults were currently having the symptoms of renal calculi. Hence, there is a need to identify determinants of renal calculi in local area for planning prevention program.

## CONCLUSION

The prevalence of renal calculi among people residing in urban area was found to be low.

**Source(s) of support** : Nil

**Conflicting Interest** : Nil

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