



EVOLVING EPIDEMIOLOGY AND ECONOMIC BURDEN OF RENAL STONES IN RURAL INDIA – A RETROSPECTIVE STUDY

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Abstract:

People living in tropical belt or “stone belt”, like India are those who suffer from renal stone ailments resulting from rising temperatures and profuse sweating. Geographical factors combined with improper hydration, genetics, gender, diet and obesity increase the risk of formation of stones. This paper analyses the evolving epidemiology and the direct and indirect costs associated with the disease in rural India. Over a period of 22 months, January 2014 to October 2015, patients visiting a speciality clinic in rural Tamilnadu with mild to acute pain and diagnosed with renal stones, were the chosen 105 samples for this study. Treatment methods were studied and the financial implications were analysed. The results were grouped and analysed in MS-excel. The male female ratio of the patients in the study period was 1:0.3. May-September months show increased incidences of stone formation. People in the productive age group are most affected. Direct costs include -medical, pharmacy, radiology scan and laboratory tests to diagnose the condition. Unsuccessful conservative treatments resulted in an average of ₹ 25000 being spent for surgical procedures. Indirect costs include loss of wages due to absence from work during outpatient / inpatient visits to the hospital. Awareness on dehydration being a major risk factor for renal stone formation; the economic burden of the disease, recurrence rates and disease prevention among the rural Indian population needs to be advocated. Further research with relevant recommendations for policy makers to implement awareness programmes and management strategies for those at risk is suggested.

Key Words: Renal Stone Prevalence, Impact of Renal Stone, Dehydration, Preventive Care, Rural Healthcare

Introduction:

Extensive research on Hypertension, Diabetes and cardio vascular diseases has been done at a national level. However a non-communicable disease like Nephrolithiasis, the medical term for renal stones affects one in every 20 people at some point in their life especially in tropical countries like India. Other than a few isolated studies, little is known on the prevalence of renal stone cases nationwide. Though Tamilnadu does not belong to the stone belt region of India, increased incidences of renal stones are reported in this tropical and semi-arid state. Awareness does not exist among the rural population that the geographical factor combined with improper hydration, genetics, diet and obesity increase the risk of formation of stones. Dehydration is a major risk factor for renal stone formation. A retrospective study was conducted in a speciality hospital in Arakonam taluk, Vellore district of Tamilnadu. A total of 105 samples were chosen for the study. All the patients suffered from mild to acute pain due to the formation of renal stones. Since gender, Age and Obesity are contributing factors to the formation of renal stones these parameters were included in the study. Other factors have not been duly considered.

Direct and Indirect costs can be avoided, if the population residing in the tropical regions hydrate themselves sufficiently. This paper will analyse the contributing factors

of the disease. Furthermore it aims to find out the direct and indirect costs associated with the treatment of the disease.

Literature Review:

Healthcare delivery for a community will be primarily for those with diseases and secondarily for those who are apparently healthy but at health risk. The services required for the apparently healthy group focuses on improving the environmental conditions and preventive measures and treatment options against definite determinants of health affecting the community.

For non- communicable disease, at the state level, screening for diabetes and hypertension in the rural Population of Tamilnadu covering 1.2 crore families was an initiative taken by the National Mission Tamilnadu as part of the "nalamana tamizhaga" scheme from 2010, alongside nutrition counselling and immunization protocols.

India being in the tropical belt is one among the six countries falling in the "stone-belt" region. Isolated research on prevalence of the renal stone formation, causes of the disease, gender based studies, regional variations, and recurrence rates are available. Madhvi, Malhotra and Rajni 2011 in their study in Kangra district of Himachal Pradesh, India have made precise reference to the usage of ground water for consumption by renal stone patients. However, Ravikumar et al 2012 tested in his studies in Urban Thanjavur, Tamilnadu state, the significance of ground water composition on renal stone patients and concluded that decreased water consumption is the primary cause of renal stone formation in patients. Peer reviewed Medical journals concentrate on the composition of renal stones with treatments methods and preventive measures which are beyond the scope of this paper.

Research done by Ksenia and Manoj 2014 contributes significantly to the formation and causative factors of the composition of renal stones across genders. Geographic residence, season and gender have varying impact on the formation of renal stones. American Urological Association in its current website clearly states that 'Urinary stone recurrence rates approach 50% at 10 years'. Preventive measures for such patients will reduce the economic burden due to recurrence of the disease.

Yet limited literature is available on the economic impact of renal stones worldwide as well as in India.

Methods:

For this study on the occurrence rate and economic burden of the disease, only those patients with confirmed diagnosis of renal stones were considered and consent was obtained to use their data, anonymously for the study. With approval from the specialist concerned, relevant data was obtained from the hospital information system of a speciality hospital in rural Tamilnadu. Over a period of 22 months from 21st January 2014 to 15th October 2015, patients consulted with mild to acute pain were chosen as samples for this study. The samples were grouped gender-wise and their age, weight, blood pressure, other illnesses and primary diagnosis with exact dates were tabulated. Treatment methods including surgical interventions were noted and the financial costs incurred by the patients were used in the study. A total of 105 samples were chosen. The male female ratio of the patients in the study was 1:0.3.

The results were analysed using MS-excel and graphs showing the peak months of renal stone incidences, contributing factors like age and weight were analysed gender-wise and graphically presented.

The costs incurred from surgical interventions were studied and the results are explicitly presented in the form of a graph. Though the different surgical inventions

performed across groups have been shown, the costs incurred by the patient independent of the surgical method were considered for discussion.

Results:

Retrospective study was conducted in a speciality hospital in Arakonam taluk, Vellore district of Tamilnadu. A total of 105 samples were chosen for the study. All the patients suffered from mild to acute pain due to the formation of renal stones.

May to August months showed increased number of reported cases of renal stone among men. Among females, July- September months was the peak period. Fig 1 shows the reported cases across the years 2014 and 2015.

During the productive age, the costs incurred by the male and female patients due to surgical treatment of renal stones are clearly shown in fig 2. The average age of the 79 male patients was 40.4, ranging from 19-75 and among the 26 Female patients the average age was 41.8, ranging from 18-70.

The ratio of the male to female patients suffering from the disease during the study period was 1:0.3.

35% of the male patients and 25% of female patients weighed 61 to 70 kgs. For men, the mean weight of the patients was 66.3 kgs and for women it was 55.7 kgs. When conservative treatment was unsuccessful it is understood that an average of ₹ 25000 was spent for surgical interventions. For the samples under study, conservative treatments were unsuccessful, therefore the costs incurred for surgical interventions have been analysed across genders and shown in figure 4.

Discussion:

The factors contributing to the evolving epidemiology have been discussed independently.

Geographical Significance:

May to September months showed the maximum number of reported cases. Peer reviewed literature clearly states that region of residence contributes significantly to the formation of renal stones. Improper hydration and profuse sweating particularly during summer months increases the concentration of the urine resulting in precipitation of stones.

Age:

The average age across genders suffering from renal stones was 40 and 41 years in the study. The disease occurring in the productive age of the population affects the performance of the working community. This results in indirect costs which includes loss of wages due to absence from work during outpatient and inpatient visits to the hospital.

Gender:

Gender based studies show that increased incidences of renal stone are explicitly seen among men. In this study also the ratio of reported cases between male and female patients was 1:0.3. Among males, 3.16% had stones in both the kidneys and 2.37% had bladder stones. Among females, 1.04% had stones in both the kidneys and 0.5% had bladder stones.

Obesity:

It has been known to be one of the contributing factors to the occurrence of renal stones. In the population under study, the results linking obesity to the formation of renal stones was inconclusive.

Economic impact

Direct costs include medical, pharmacy and radiology scan and laboratory tests to diagnose the condition. The range of direct costs are, consultation costs ranging

₹ 300-₹ 500 , costs of drugs for initial conservative treatment ranging from ₹ 100- 1500 , Ultrasound scan from ₹ 250 to about ₹ 1500 for a CT scan. In some repeat scan was suggested after initial treatment. Expenses towards laboratory tests to diagnose the condition ranged ₹ 300-400. Among men, only 5 patients had no invasive procedure done and in female patients only 1 patient passed out the stone without any invasive procedure. Indirect costs include loss of wages due to absence from work during outpatient and inpatient visits to the hospital.

Conclusion:

As mentioned, dehydration and low urine output are the primary causes of stone formation as evident with the incidences spiking during and soon after the summer months, therefore awareness on fluid consumption of about 3-4 litres per day based on increased perspiration during summer will contribute immensely in reducing the direct and indirect costs that patients incur. Since recurrence rates are significantly high in renal stone patients advocating the economic burden of the disease, stone recurrence rates, disease prevention and management strategies are essential. Given that only isolated research is available on the occurrence of this disease in India; further research is recommended on the same so that policy makers can strategically plan at a national level to manage the disease in India.

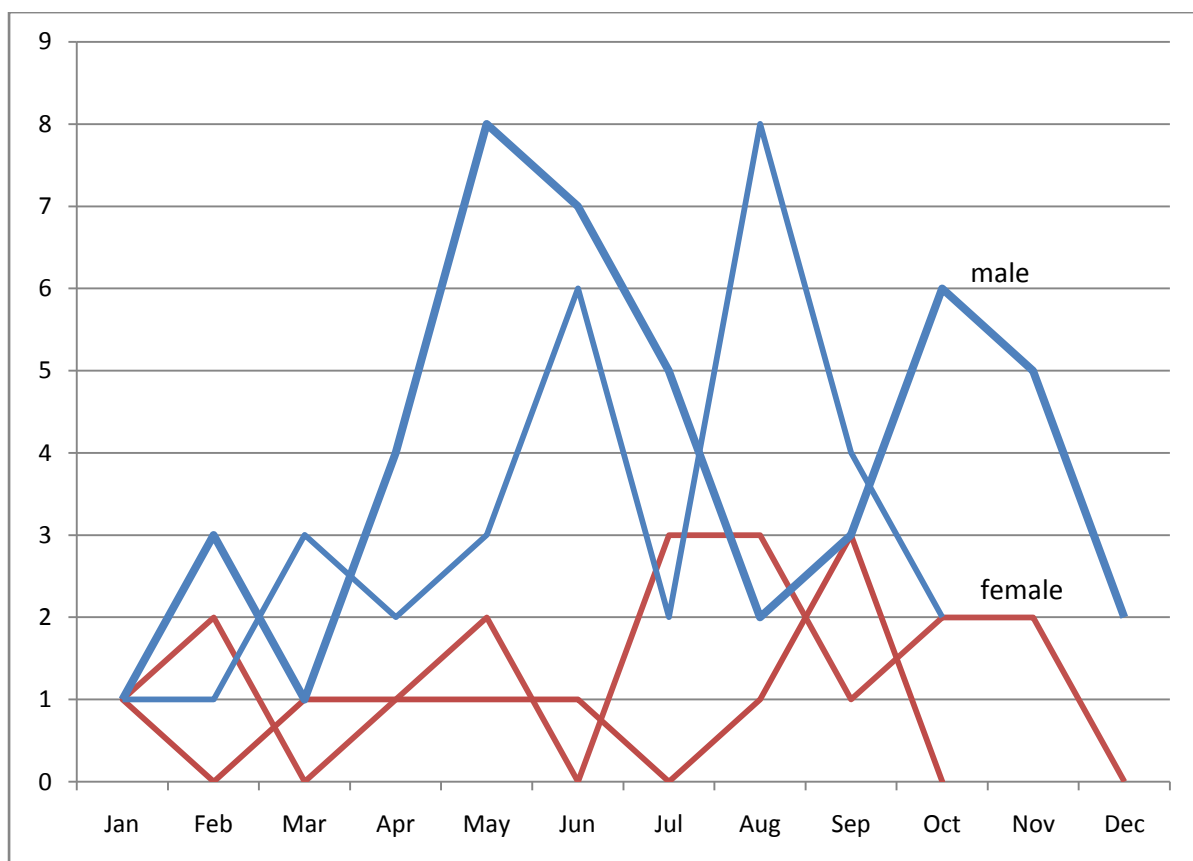


Figure 1: peak period of incidences in male and female patients with renal stone
2014, 2015

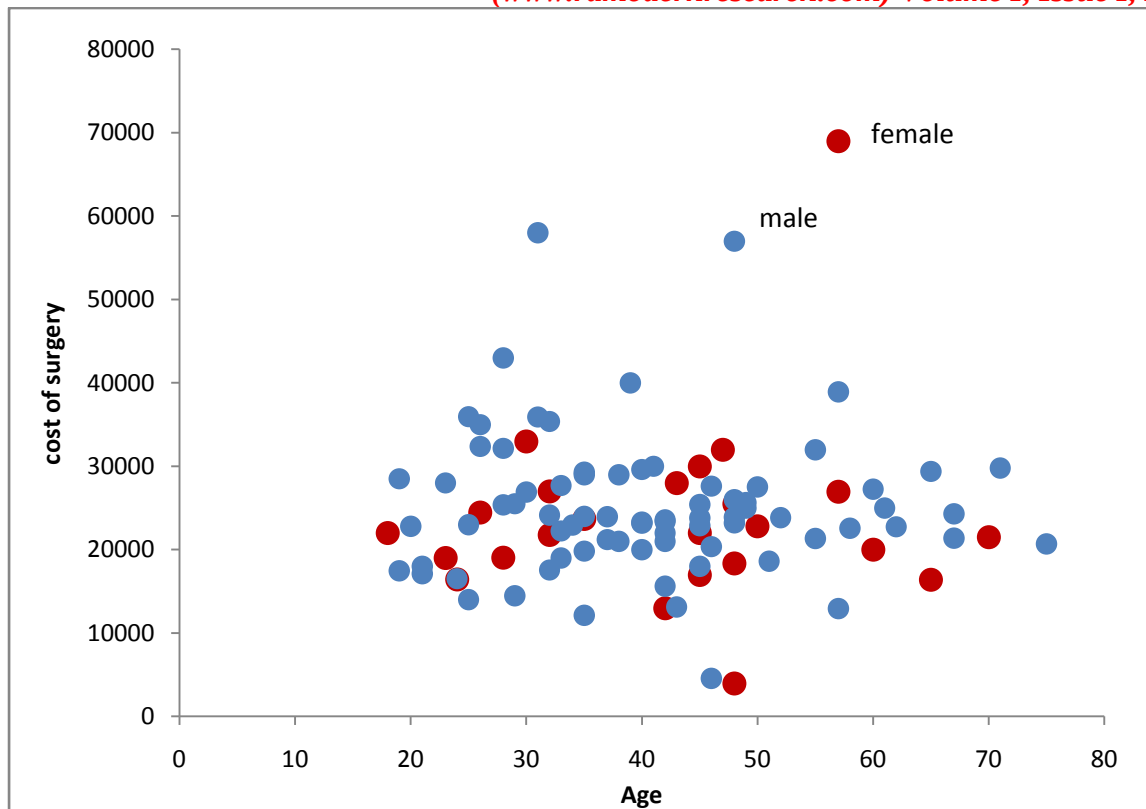


Figure 2: productive age affected by renal stone surgery

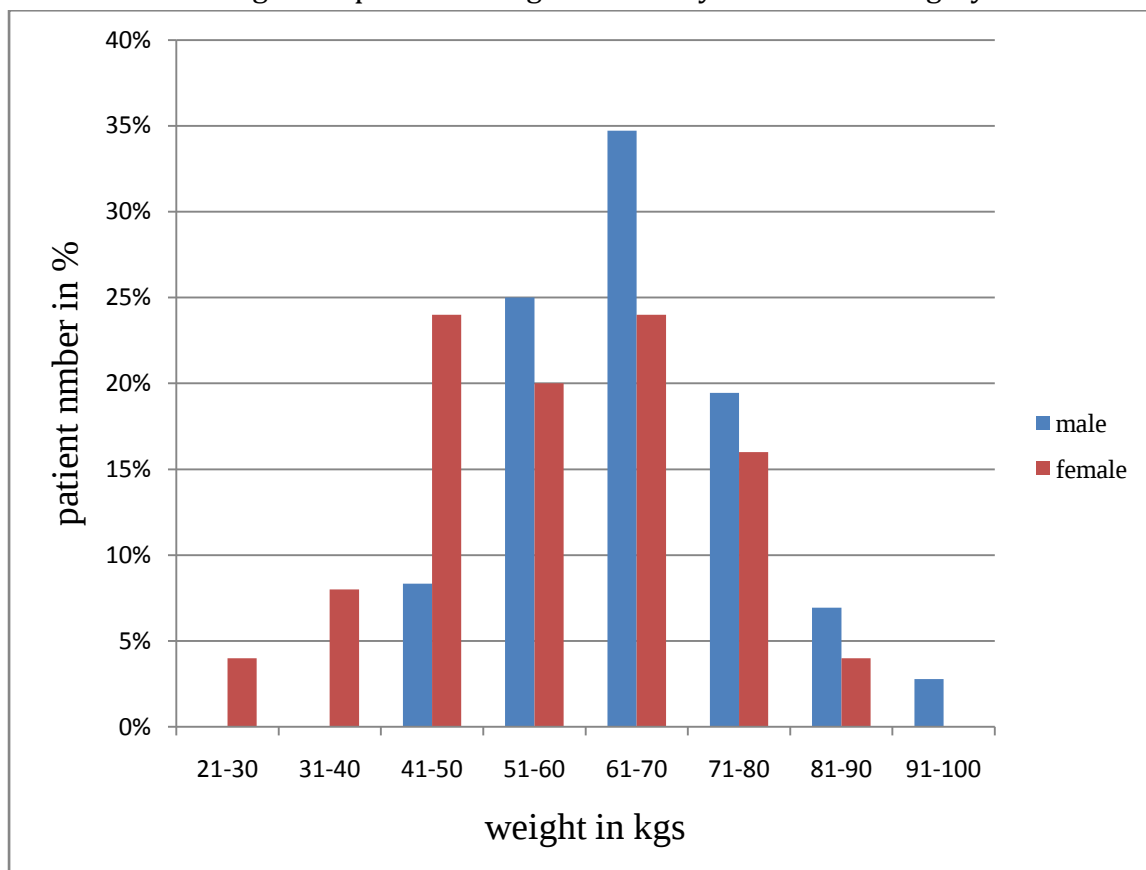


Figure 3: Obesity vs. renal stone incidences

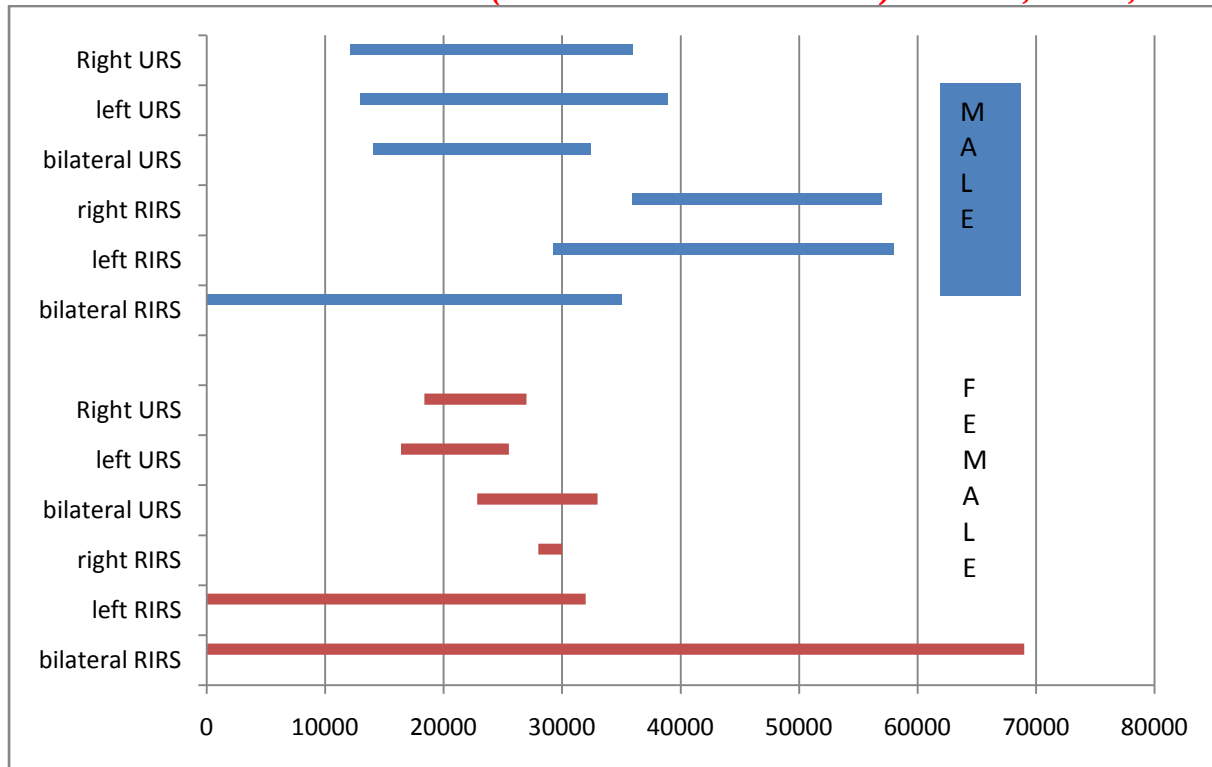


Figure 4: cost of surgery for male and female patients for different surgical interventions

Abbreviations:

URS- Uretroscopy

RIRS- Retrograde Intrarenal Surgery

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