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Research Article

Study on Analysing of Risk Factors and Prevalence of Urolithiasis in the Tertiary Hospitals of Erode, Tamil Nadu

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Abstract

Aim and Objective: Urinary stone occurrence is predicted as 3% in all individuals and it affect up to 12% of the population during their lifetime. Urinary stone forms with standard range of 50% at 10 years of age and male has the highest proportion. Due to various etiological and risk factors it became a great burden socially and economically. So it is relevant to conduct a study on risk factors and prevalence associated with urolithiasis.

Materials and Methods: A total of 110 patients were followed over a period of 9 months, and the prevalence and risk factors was studied. Data was collected with a self-administered questionnaire.

Results: The prevalence of stones have markedly increased over the past 30 years and is of great concern in aging population. Out of 110 patients we found that 54.5% were females, 65% were in between the age 45 - 65 years, 39.9% stones are between 9 - 12 mm, 39.09% of stone prevalence was at climate 84 - 86^{0}F, 72% were smokers, 35.45% were hypertensive patients, 55.45% had improper fluid intake and 21.8%.

Conclusion: The relationship between the risk factors and prevalence had been established. The data shows the risk factors has a higher impact in formation of urolithiasis. The prevalence of urolithiasis was increased in higher temperature as a result of imbalance between input and output of fluids.

Keywords: Urolithiasis; Risk Factors; Prevalence

Introduction

The utmost preeminent prevalent urological disorder of the urinary system is lithiasis [1]. Urolithiasis are minuscule hard crystal evolution from uric acid or calcium, magnesium, ammonium ion phosphate, calcium oxalate which is found to be hasten in urine, start to get built up in the inner surface of the kidney [2]. Risk factor and mortality rate of urolithiasis is increasing widely, although there is still significant rate of renal deuteriation with certain stone types.

The geographic role of stone disease roughly tends to associate with environmental risk factors, a higher prevalence of stone disease is erect in hot arid, or dry climate such as mountain, desert or tropical area. The dietary factors will also influence the stone recurrence and formations.

The body weight and body mass index have a major impact in incidence of stone formation [3]. With the changes in the socio economic conditions there will be a gradual change in the prevalence, incidence and distribution for age, sex, and type of urolithiasis in terms of both the site and the chemical-physical composition of calculi. The prevalence rate of the stone disease can be determined through a thorough understanding of risk factors, epidemiology and pathogenesis of urinary tract stone disease is necessary so

as to develop an effective medical prophylactic program. In India, about 12% of population is expected to have urinary stone, out of the total 50% may end their life with loss of kidneys or renal damage. Nearly 15% of population of northern India suffers from kidney stones. A urinary calculi occurrence is fewer in southern India.

In Tamil Nadu the overall prevalence of urolithiasis 37% in female and 43% in male [5]. As per the literature there is no study conducted in erode so, it is relevant to conduct a study on risk factors and prevalence of urolithiasis in our state Tamil Nadu, particularly in the Erode district.

Materials and Methods

A prospective observational study was undertaken with 110 patients were followed over a period of 9 months, and their prevalence and risk factors was studied. Informed consent from the patients were properly maintained. Data were collected from patients who were admitted in the tertiary care hospitals of Erode with self-administered questionnaires and data's adopted from Nalini SH., *et al.* [5] with slight alterations. The data was collected and properly chronicled. We visited the patients who are suffering from urolithiasis all the data's were collected through the questionnaires. Data's collected were entered into the excel sheet and the data's that didn't seems to be satisfactory to our study got eliminated. The study duration was for a 9 months period we saw the prevalence was more in summer seasons. We took totally 150 samples but the necessary data's were incomplete in some patients so we excluded 46 patients. We include all the patients who were ready to give informed consent and who were diagnosed as urolithiasis. We excluded pregnant patients, post menopausal women with low estrogen levels and women who had their ovaries removed.

Statical analysis

The association between risk factors and urolithiasis variables was assessed using Fisher' exact test. Results are presented as mean and SD. A two sided p value < 0.05 was considered to represent statical significant differences. Statical test was performed with Graph pad prism version 2.8.

Results

The study was conducted among 110 patients in the tertiary care hospitals of Erode. Out of them, 50 were males (45.5%) and 60 were females (54.54%). Francis., *et al.* [6] in a retrospective study of ages ranged from 3 to 87 years with a median of 42; males were the majority (79%) and the commonest presenting symptoms were flank pain (91%) and dysuria (19%). We took patients from the age of 25 years to above 60 years in that we found that 50 patients (45.4%) were age between 42 - 65 years. It has been found that urolithiasis is more prevalent between the age of 42 and 65. In our study majority of the patients (57.26%) were literate. The number of patients admitted for the treatment of urolithiasis during each seasons were showed in table 1 and 2. 39.09% of patients visited in OPD for treatment during summer season (May to June). The annual maximum average temperature in Erode, Tamil Nadu, India is 84 - 86° F. The highest temperature is often registered in May which is the hottest month in the state. 62 patients (56.36%) had stone at the renal region and 43 patients.

SI: NO	Temperature	Number of patients (n = 110)	Percentage (%)
1	72-77^0 (November-January)	27	24.54%
2	72-84^0 (February-April)	32	29.09%
3	84-86^0 (May-July)	43	39.09%
4	82^{0}F (August-September)	8	7.27%

Table 1: Prevalence based on climate.

SI: NO	Risk Factors	Variables	Cases	P value, SD
1	Dehydrated	Males	40	SD = 27.5 + -12.964, p = 0.021
		Females	35	
	Non dehydrated	Males	10	
		Females	25	
2	Fluid intake < 2-3 litres a day	Males	42	SD = 27.5 + -13.134, p = 0.0302
		Females	39	
	Fluid intake > 2-3 litres a day	Males	8	
		Females	21	
3	Tea intake more than 2 cups a day	Males	44	SD = 27.5 + -17.794, p = 0.0213
		Females	41	
	Tea intake less than 2 cups a day	Males	6	
		Females	19	
4	Coffee intake more than 2 cups a day	Males	41	SD = 27 + -16.143, p = 0.0277
		Females	40	
	Coffee intake less than 2 cups a day	Males	7	
		Females	20	

Table 2: Risk factors analysis.

(39.09%) had a stone size of 9 - 12 mm. 61 (55.45%) patients did not drink required water (2 - 3 lit/day) daily. 33 (30.00%) patients were observed pain in voiding.

We also found that 36 (72%) patients have the habits of smoking and 38 (76%) patients have the habits of alcohol consumption, on using Fisher's exact test the results seems to be clinically significant. Data interpretation was done with graph pad prism version 2.8 and interpretation of graphs were also made as shown in figure 1 and 2. 110 patients 39 (35.45%) patients had Hypertension, 26 (23.26%) had diabetes mellitus, 17 (15.45%) patients had both, 10 (9.09%) patients had urinary tract infections and 18 (16.36%) patients doesn't had any associated diseases. Out of 110 patients 5 (14.54%) patients undergone ESWL,14 (16.36%) patients undergone PCNL, 73 (66.36%) patients undergone open surgery, 14 (12.72%) patients undergone MET.

Figure 1: Risk factor distribution based on alcohol consumption.

Figure 2: Risk factor distribution based on habit of smoking.

For risk factor analysis we used Fisher's exact test, for dehydration status (p = 0.021) SD = 27.5 + -12.964, for fluid intake (p = 0.0302) SD = 27.5 + -13.14, for coffee intake (p = 0.0213) SD = 27.5 + - 17.794 and for tea intake (p = 0.0277) SD = 27.5 + -16.14. The result was found to be clinically significant as we fix p value 0.05.

Discussion

Lithiasis fluctuate in size and stone type between diverse climates and racial groups. It is important to understand the epidemiology of stones disease so as to determine the significance of the disease at the community level, the associations of risk factors in individuals and the likelihood of stone recurrence [7]. Cosmic climate diversion is another environmental factor which elevates the risk of stone disease. The impact of global warming has been a major threat for many years, and today it is approved as a sensible phenomenon. Studies have an association between elevated environmental temperatures and increased stone rates [8].

Seo Yeon Lee., *et al,* conducted a prevalence study in Seoul to analyses the overall cumulative exposure and lag response relationships between daily temperature on urolithiasis presentations by using a time-series design and concluded that urolithiasis presentation get increased with increased in temperature [9]. Our study also seems older age is a major risk factor for lithiasis. The incidence of urinary stones diverge in accordance to age. Subjects with age under 45 years old the prevalence is 45.45.58%, while in those over 65 it is 18.18.7% [10].

An elevated rate of small ureteral stones has been seen [11]. This could be due to the widespread use of extracorporeal shock wave lithotripsy (ESWL), with subsequent use of noninvasive diagnostic techniques such as ultrasound and spiral computed tomography [12].

Cross-section studies have shown that urolithiasis is more frequently found in hypertensive patients than in normotensive subjects. Borghi., *et al*. [13] demonstrated a greater risk of stone formation in subjects with hypertension associated with excess body weight.

In our study we found a significant relationship between dehydration and urolithiasis.

Mohammad Reza Tamadon., *et al*. in their study the percentage of smokers among patients with urolithiasis was significantly higher than in the control subjects. Cigarette smoking was 2.06 times more common in stone formers than in the control group. Hence,

smoking may be an independent risk factor for nephrolithiasis. One of the possible factors which may explain the effect of smoking on stone formation is a high body cadmium and lead level in smokers. Cigarette smoking may induce urolithiasis by decreasing urinary flow and increasing serum cadmium in healthy subjects [14].

Conclusion

From this study we concluded that urolithiasis is a multifactorial disease; many factors can increase the risk of stone formation. We can establish a significant relationship between risk factors and urolithiasis such as age, gender, dehydration, personnel habits, temperature and fluid intake. Overall study reveals a close relationship between temperature and urolithiasis presentations. With increase in temperature there is decreased fluid intake thus leads to formation urolithiasis. Increased fluid intake is an effective preventive measure for the prevention of lithiasis. We concluded that prevalence of urolithiasis increases with temperature. We can reduce the stone formation by giving the patients with proper education and proper follow up.

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