



Original Article

Renal Stones among Adult of Hodeidah as Subtropical Region in Yemen: Prevalence, Risk Factors and Common Medication Used

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ARTICLE INFO

Received 02 April 2016

Received in revised form 16 May 2016

Accepted 31 May 2016

Keywords:

Renal,
Stone,
Prevalence,
Medications,
Use,
Yemen.

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ABSTRACT

Objectives: Renal stone is a common and a major cause of morbidity worldwide including Yemen. Therefore, this study was aimed to increase understanding of the prevalence and risk factors of renal stone in Hodeidah, Yemen and to identify of common medication used for its treatment because the lack of research done in this field in Yemen.

Methods: A cross-sectional observational study conducted by recruiting case-series of adults and elderly who have renal stones within the age group from 18 to 85 years. 875 subjects received a simple explanation for the aim of the study an ethical issue. The subjects were allowed to complete a self-conducted screening questionnaire. The data were analyzed according to the Excel 2010 Software.

Results: The results showed that renal stones were 27.31 %, renal salts were 39.65 %, and healthy subjects were 33.0 %. On the other hand, the renal stone and salt were found 70 % in male and 30 % in the female, relationship between the renal stone and age and sex of subjects was statistically significant ($p < 0.05$). Also, the common risk factors were the dehydration because the hot climate of Hodeidah as subtropical region and nutrition. In addition, 19 % of the subjects was treated pharmacologically, 26 % of the subjects was treated traditionally, 41 % combination and 14 % was treated surgically.

Conclusion: The prevalence of renal stones is rising worldwide, namely in Hodeidah, Yemen, especially in men and with increasing age. Also, absence of health attention and education regarding renal dissolved agents used.



Introduction

Renal stone is a common and a major cause of morbidity worldwide including Yemen the roots of modern science and history of urinary stone disease go back to the *Ancient Egyptians* and *Mesopotamia*¹. They were found in 1 % of all autopsies². Urinary stones have become increasingly common in most parts of the world in recent years³. The stones cause severe pain and are also associated with morbidity and renal damage⁴.

In general, urinary stones may contain various combinations of chemicals that become concentrated enough in the urine to form crystals. The crystals grow into larger masses (stones), which can make their way through the urinary tract. If the stone gets stuck somewhere and blocks the flow of urine, it causes pain. The most typical stones contain calcium in combination with either oxalate or phosphate. Much less common are the uric acid stones as the body metabolizes protein and the rare cystine stones⁶⁻⁹.

The major objectives of our study is a continuation to these studies to increase understanding of the prevalence risk factor of renal stones, to correlate the renal stone with demographic data and risk factors that are lacking in Hodeidah as subtropical region in Yemen. Also to estimate the common medication used for the treatment of renal stone.

Methodology

Study area

Hodeidah Governorate borders the Red Sea and is part of the narrow Tihamah region. Its serves as an important local port city. With a population of 2,687,674 and an area of 17,509 km². It contains 26 districts, three of them in the urban (Hali, Hawak and Meena districts) the remaining districts are in the rural areas¹⁰.

Study design

A cross-sectional observational study conducted by recruiting case-series of adult and elderly within the age group between 18 – 80 years of age. The study was carried out in Hodeidah from December 2014 until March 2015. The inclusion criteria of patients accommodates in Hodeidah as subtropical region in Yemen and the patients was excluded that accommodates in non – subtropical region in Yemen.

Ethical issues

Informed consent was obtained from each participant after a clear explanation of the study objectives. The study protocol was approved by the office of Public Health and Population.

Samples collection and questionnaire

The study included 870 subjects from four Hodeidah governorates that were selected to estimate there months overall prevalence in Yemen. Subjects were approached at their work places, classes or homes and selected in random manner. Every subject was asked to complete a self conducted questionnaire in the presence of the researcher to answer any inquiries and then reviewed immediately after receiving from the subject to ensure that was accurate and complete. Researchers were interviewed illiterate subjects to complete the questionnaire. The questionnaire gathered information that included demographic data, family history, frequency, diagnosis, type of nutrient, and its impact on everyday activities, medications use, consultation regarding medication increasing with time , and frequency of renal stones after treatment usage.

Data analysis

Interview and clinical data were analyzed using Excel 2010. The descriptive analysis and the Chi-square test were used to

make comparisons among categorical variables. For all statistical analyses, a p - value of less than 0.05 was considered statistically significant.

Results

Subject characteristics

A sample of subjects ($n = 875$) that were selected from four Hodeidah governorate of Yemen within the age from 18 to 80 years. The sample of study was represented in the males 30 % while in the females 70 %. As shown in Table 1, 20 % of the subjects were Illiterate followed by elementary school (20 %), secondary school (50 %), and graduate students (30%). 70 % were rural people and 30 % were urban. All patients with renal stone were diagnosed by urinal analysis and ultrasound

Prevalence of renal stones and salts

The renal stones and salts were found in 66.97 % ($n = 589$), the characteristics of patients were shown in **Table 2**. Renal stones were 27.31 % and renal salts were 39.65 %, and healthy subjects were 33.0 %. However, this difference between them was statistically significant ($p < 0.05$). On the other hand, the relationship between the renal stones and age and sex of subjects was found and was statistically significant ($p < 0.05$). In addition, the higher frequency of renal stones and salts was in adults between 18 – 29 years (76.85 % and 70.30 %), respectively and the lower frequency was in elderly more than 50 years (4.20 % and 4.40 %), respectively.

Risk factors

The common risk factors were recorded for renal stones and salts patients were dehydration and nutrient. 36 % of dehydration for renal stone and salts patients. 31 % and 41 % of nutrient (high protein), respectively **Table 3**. On the other

hand, the relationship between the renal stones and dehydration and type of nutrient was statistically significant ($p < 0.05$).

Common Medication Used

The use, abuse and incidence of medications in 589 patients with renal stones and salts were studied. 19 % of the subjects was treated pharmacologically, 26 % of the subjects was treated traditionally, and 54 % was treated surgically. Firstly the common medication pharmacologically used for renal stone and salt treatment were 33 % of Uricol (Hexamine, Piperazine citrate and Khellin); 23 % of Epimag (Magnesium Citrate); 16 % of Rowatinex “(Essential Oil), 10 % of Kellagon (Extract uscat de Ammi Visnaga and Extract uscat de Cymbopogon Proximus); 6% Urimax (Tamsulosin); 3 % of Cystone (Small Caltrops, Pasanabheda, and Shilapushpa); and 9 % of other medications (Figure 1). Secondly, the common medication used traditionally for renal stone and salt treatment were 30 % of Thyme (30 %) and 70 of Bere (Figure 2).

Discussion

The study on prevalence and incidence of nephrolithiasis in Yemen is very rare but the most study is reported entitled chemical composition of urinary stones in patients with urolithiasis in Yemen and the results showed that 54.6 % of the calcium oxalate, 6.3 % of the uric acid, 0.7 % of the calcium phosphate, 29.6 % of the calcium oxalate and uric acid, 6.7 of the calcium oxalate and calcium phosphate, 1 % calcium oxalate and calcium carbonate, 0.5 % of the calcium oxalate, calcium phosphate and uric acid, 0.5 % of the calcium oxalate, calcium carbonate acid¹¹. The prevalence and incidence of nephrolithiasis is reported to be increasing across the world¹². A previous studies was reported to identify the prevalence of kidney stones. In previous reports the prevalence of kidney stones

varied greatly between geographic locations, ranging from 8% to 19% in males and from 3% to 5% in females in Western countries. In Germany¹³, a prevalence has risen from 4% to 4.7% from 1979 to 2001. In the year 2000, the incidence of urolithiasis in Germany was found to be 1.47% (1979: 0.54%). Renal stone prevalence among 20 to 74 old US residents was greater in 1988 to 1994 than in 1976 to 1980 (5.2% vs 3.8%) and it was greater in males than females¹⁴. On the contrary data for the Rochester population over the years 1970-2000 demonstrated an age-adjusted incidence of new onset symptomatic stone disease for men of 155.1 and 105.0 per 100,000 per year in 1970 and 2000, respectively, and for women of 43.2 and 68.4 per 100,000 per year, respectively¹⁵. During the 30 years, rates for women increased by about 1.9% per year, whereas rates for men declined by 1.7% per year. A surprisingly high 15% prevalence of urolithiasis was observed in the rural population of Thebes in Greece¹⁶. In Iceland¹⁷, the age-standardized prevalence for the 30-79 years age group was 4.3% for men and 3.0% for women, with no significant increase over time. The incidence was 562 per 100 000 per year among men and among women was 197 per 100 000 per year. In Iran¹⁸, the prevalence was estimated as 5.7%, slightly more frequent in males (6.1%) than females (5.3%) whereas the annual incidence of urolithiasis in 2005 was 145.

The major risk factor in Hodeidah, Yemen is dehydration because the hot climate in this region. The stone problem in the tropics and subtropics is compounded by low urine volumes resulting in some areas from poor drinking water, which causes dehydration because the hot climate and fluid losses through the skin¹⁹.

The treatment of patients with urinary stones has two aspects in our study: firstly, dissolving by using pharmacological

and traditional therapy or surgically removing stones already lodged in the urinary tract; and, secondly, preventing recurrence. Generally, recurrence of most types of stone should now be preventable with dietary and medical measures²⁰. Recent study published entitled kidney stones: an update on current pharmacological management and future directions. Medical treatment of kidney stones includes dietary management, disease-specific therapies, and medical expulsion therapy (MET) of stones. Fluid intake to promote urine volume of at least 2.5 L each day. Dietary recommendations should be adjusted based on individual metabolic abnormalities. Reduction of animal protein and salt intake, higher fluid intake and potassium consumption should be implemented. Medical treatments involve the use of thiazides (the standard therapy for calcium stone formers with idiopathic hypercalciuria), allopurinol (It used in calcium oxalate stone formers with hyperuricosuria), Pyridoxine (It has been shown effective in some cases of primary hyperoxaluria type I), Tiopronin (it can be used if urinary alkalinization), Tamsulosin that blocks the Alpha adrenergic receptors to cause smooth muscle relaxation or other drugs according to the metabolic disturbances. Nifedepine is calcium channel blockers that causes inhibition of calcium channels in distal ureter and decrease the contraction and spasm caused by distal ureter calculus. Steroids are also found to be useful as medical expulsive agents in distal ureteric stones. Treatment of cystine stones remains challenging. and adequate fluid intake are insufficient. For struvite stones, complete surgical removal coupled with appropriate antibiotic therapy is necessary²¹⁻²³.

Conclusion

The prevalence of renal stones is rising worldwide, namely in Yemen, especially in men and with increasing age. Also, absence of health attention for risk factors that cause renal stone formation and education regarding renal dissolved agents use lead to overuse of such medications and could be one of the reasons beyond development of renal. In brief, the awareness is very important for prevention of renal stone formation. Also, dietary management, disease-specific therapies, and MET of stones are necessary in order to provide the correct treatment to patients. On the other mean, the educational programs should be planned and implemented to known the risk factors, to ensure safe practices and to limit random usage of medication.

Acknowledgments

The authors would like to thank students of nursing department of AL-Shiefa College for Medical and Technical Sciences, Hodeidah City, Yemen for their help in data collection and entry.

Conflicts of interest

The authors declare that there is no conflict of interests regarding the publication of this paper.

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Table 1: Demographic data (n = 875)

Characteristic	n %
Gender	
Male	30
Female	70
Age (Years)	
	18 – 80
Education	
Illiterate	20
Elementary school	20
Secondary school	30
Graduate	30
Rural/Urban	
Rural	70
Urban	30
Monthly income	
Low (< 232 \$ US)	40
Medium (232 - 462 \$ US)	50
High (> 462 \$ US)	10

Table 2: Demographic data (n = 589)

Characteristic	Renal stone n = 236 (27.31 %)			Renal salts n = 345 (39.65 %)	
	n	%	p value	n %	p value
Gender					
Male	150	63	$p < 0.05^*$	45	$p > 0.05$
Female	87	37		55	
Age (Years)	18 – 80			18 – 80	
Education					
Illiterate	47	20		20	
Elementary school	47	20		25	
Secondary school	71	30		35	
Graduate	71	30		10	
Monthly income					
Low (< 232 \$ US)		50		40	
Medium (232 - 462 \$ US)		20		30	
High (> 462 \$ US)		30		30	
* : Significant ($p < 0.05$)					

Table 3: Common risk factors cause renal stone and salts (n = 589)

Characteristic	Renal stone n = 236		Renal salts n = 345	
	n	%	n	%
Dehydration	87	36	126	36
Nutrition	74	31	143	41

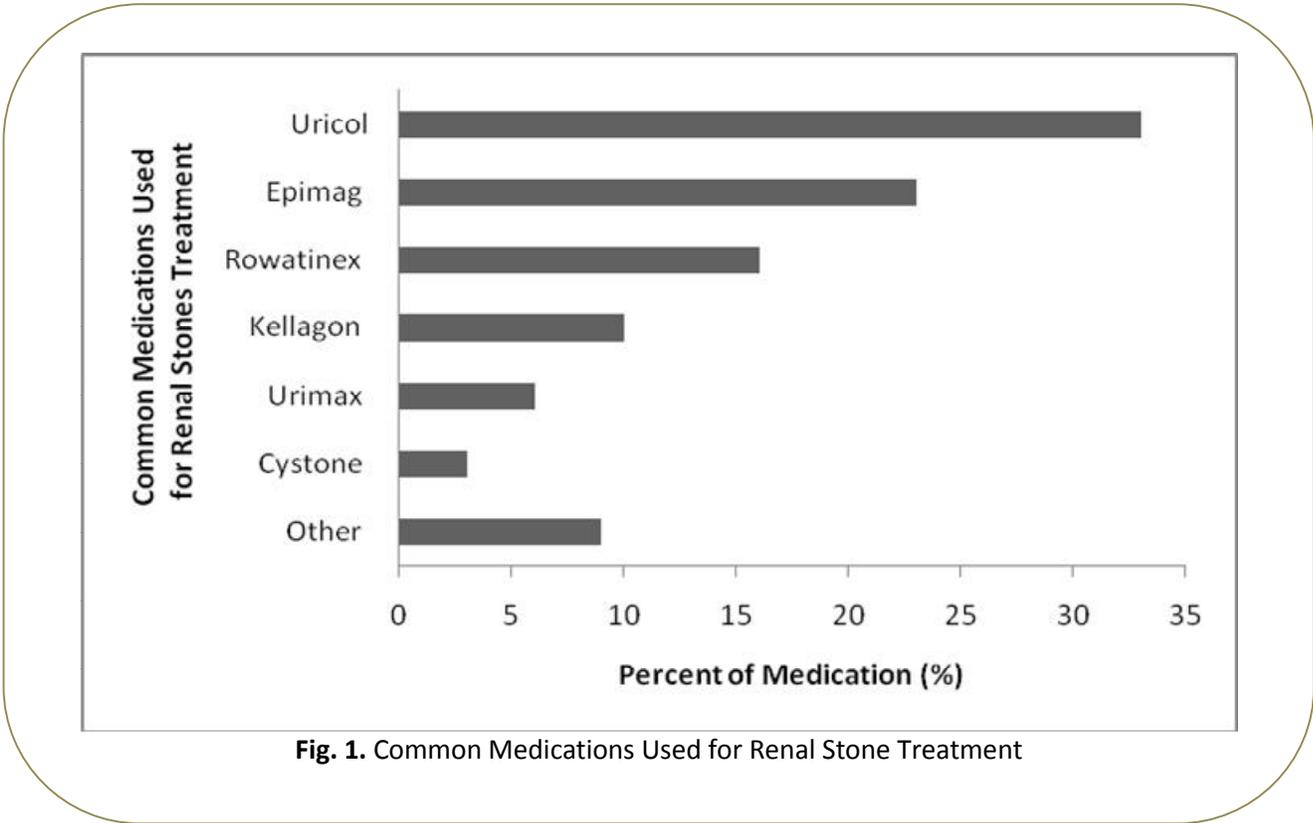


Fig. 1. Common Medications Used for Renal Stone Treatment

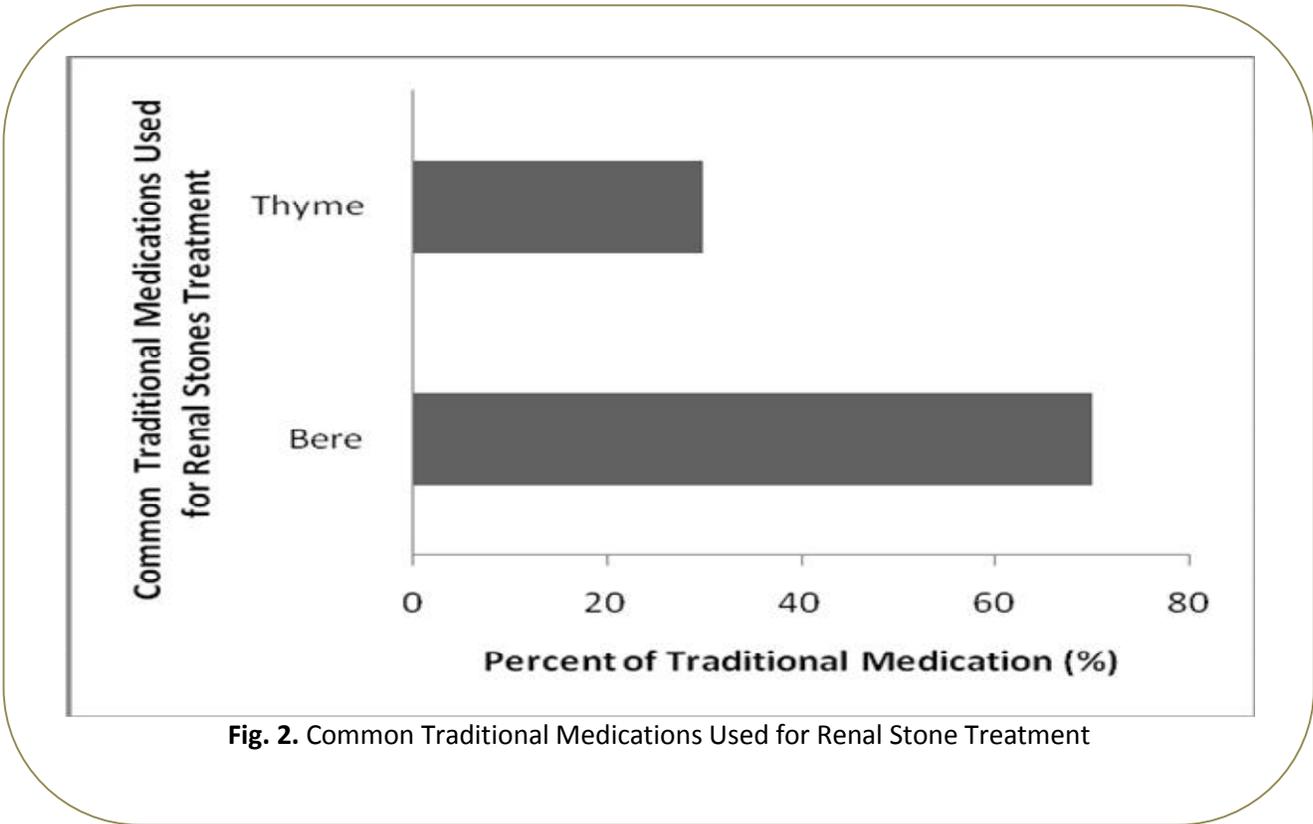


Fig. 2. Common Traditional Medications Used for Renal Stone Treatment