

## **Research Article**

### **Prevalence of renal stones and their effects on urine in Hail Region**

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**Abstract:** Renal stones are a great problem in human all over the world, the world prevalence is estimated between 1 to 5% in developing countries and differs in various parts of the world it ranges from 1- 5 % in Asia to 20% in North America, the prevalence increased in countries drinking hard grand water also increased in desert and hot climate countries. In the present work we collect 50 urine samples from random Saudi subjects from, Hail, Ugda, Qnaa, Al Khuta and Twaran, 17 cases (34%) are diagnosed as renal stone. History and physical examination revealed changes in urine as frequency urination, bad odor, dark brown color and history of chronic renal disease. Chemical Findings of urine of the 17 cases showed increase in calcium in 6 cases (35.1 %) and also oxalate found in 4 cases (23.6%), phosphate in 2 cases (11.8%) ammonium in 2 cases (11.8%) but uric acid and carbonate and magnesium in 1 case in each salt (5.9%). The morphological analysis of 17 cases revealed that calcium oxalate monohydrate found in 6 cases (35.1%), calcium oxalate dehydrate also increase in 6 cases (35.1%). Calcium and magnesium were seen in 2 cases (11.8%). Specific gravity also increased (1,050). Microscopical examination of urine sediment showed the following finding: excessive RBC, Lecosytes, epithelial cast's epithelial cells, excessive mucus and fungi like element. The fungal examination revealed candida albicans which appears as pink filaments stained by hematoxylin and eosin.

**Keywords:** renal stones, urine, candida albicans, drinking water

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#### **INTRODUCTION**

Urinary lithiasis is a common condition currently affecting 4-2% of the world population [1, 2]. The risk factor for adult developing stones ranges from low to high, In Asia 1-5% ,5-9% in Europe,13% in the USA and 20.1% in Saudi Arabia [3]. Western region of Saudi Arabia is the area of a high prevalence of renal stones due to climatic changes, Ramadan fasting and pilgrimage festival [4]. At the last part of the 20th century the prevalence of upper urinary tract stones is increased in western countries where as endemic infantile bladder stone is fairly wide spread [5] .The world prevalence is estimated between 1 to 5% in developing countries [6, 7, 8, 9].

The age plays an important factor in the prevalence of renal stones , elderly men over 65year is 4-7% in Italy 10 , but the children has a low prevalence on the others hand , silent kidney stone which can be have urolithiasis its prevalence around 3% in Pakistan [11] . Genetic is an important intrinsic risk factor for

renal stone which its prevalence may reach to 25% of patients with kidney stones in which the family has as kidney stones [12]. Renal Stones is more prevalent in males than in females; Korean men may reach to 6% but in females reach 1.8%.

Geography represented the main extrinsic factor in which its prevalence of renal stones is higher in the desert or tropical areas, renal stone in South Korea is 3.5% but in Taiwan may reach to 9.6% Climatic and seasonal factors also play important role in renal stones, in which Renal stone increased in summer months than winter months [13].

The amount of fluid intake is the most common factor for renal stone formation; increased water intake increase urine output which decreased incidence of renal stone formation, this fact is the oldest existing treatment for renal stones. Increase mineral content in the drinking water and diet also increase the renal stones formation. Large amount of bicarbonate and

large amount of calcium in drinking water increased the formation of calcium bicarbonate renal stone [14].

*Candida albicans* in the kidney may affect 10% of people during childhood, the most common infection occurred in males less than female's. *Candida* infection is one of the most common cause of renal stones [15]. *Candida albicans* usually observed in the renal pelvis and reach to the kidney through urinogenic or hematogenic infection or both, *Candida albicans* caused papillary necrosis and perinephric abscesses, these abscesses are a good media for the formation of renal stone. The location of the renal stone which may present in the kidney core or in the middle layer or in the outer layer depending upon the location of these abscesses in the kidney [16, 17].

Medication also play an important role for renal stones formation as large dose of vitamin C will increase oxalate in the blood, also vitamin D has a great affect in which repeated vitamin D injection leads to increased risk for renal stone formation [18, 19]. The recurrence rate of renal colic without treatment increased incidence of renal stone about 10% in one year to reach 35% after 5 years and many reach 50% after 10 years without specific treatment [21, 22]. The water hardness ranged from moderate (60-120mg/L) to hard (120-180mg/L) and very hard water more than (180mg/L)

## METHODOLOGY

### Sample Collection

Fifty Urine samples were collected from patient who was suffering from urinary system problems, the samples collected from Hail, Al Khuta, Uqda, Qnaqand also from Twaran regions. The samples were examined Physically, Chemically, Microscopically, Fungal Examination and also abdomen ultra sonography was applied on patient affected also water analysis was performed for Tap water; underground water and bottles water were also analyzed.

### Sample Examinations

- History and physical examination of urine  
The collected samples were examined for several changes as the amount of urine, urine color, and urine odor, frequency of urination, dysurea, and history of renal diseases, Hypertension and also the diet contents [23] .
- Chemical examination of urine  
The collected urine samples of all patients were examined for, specific gravity of urine, urine PH, protein, glucose, Kenton bodies, calcium, oxalate, nitrite, bilirobin and urobilinogen [24].
- Microscopic Examination of Urine

The sediment of urine sample was examined for the presence of RBC, leucocytes, epithelial cells or epithelial castes and the presence of bacteria or fungus [23].

- Fungal Examinations of urine  
For fungal detection the urine sediment should be included on the Sabouround dextrose agar slant and kept for several weeks, culture of the urine sediments on chromogen agar also made , and also on Corn meal agar [ Dalmu plate method] [25].
- Abdominal ultra sonography  
Abdominal ultrasonography was applied for all patients for detection of renal stone and also to detected the location of the renal stones in right or left kidney , also to detects the renal stone location in the core of the kidney or in middle layer or in outer layer in each kidneys .
- Water analysis  
Analysis of drinking water, tap water, ground water, and bottled water were analyzed by (Joseph and Malina) method [26].

## RESULTS

Fifty urine samples were collected from men only from different areas as Hail, Al khuta, Uqda, Qanaa and Twaren regions which were suffered from urinary system problems ,17 (34%) cases were diagnosed as renal stones. The urine samples of these cases were examined Physically, chemically, microscopically, abdominal ultra sonography and fungal examination and culture was done, samples of the drinking water were also analyzed

### Physical changes and history

The urine sample of the 17 cases showed the following physical changes, offensive odor, dark yellow color, less amount of urination, the patients of these cases were suffered from dysurea, and frequency urination. Some patients suffer from renal failure and hypertension; five cases only suffer from diabetes mellitus.

### Chemical changes of urine

Specific gravity of the urine of the 17 cases was higher than normal which may reach to 1.050, also the PH of the urine samples was variable from 6 to 10. Protein level was also increased glucosurea was observed only in 5 cases, ketene bodies, bilirubin and urobilinogen were also detected in the urine samples.

Calcium was severely increased in 6 cases (35.1%), Oxalate was also increased but in 4 case (23.6%), phosphate increased in 2 cases (11.8%), also ammonium was increased in 2 cases (11.8%), but

carbonate, magnesium and uric acid were increased only in one case each (5.9%) for each component [Table 1]. The morphological analysis of the 17 cases revealed that both calcium oxalate monohydrate in 6 cases (35.1%), calcium oxalate dihydrate was also found in 6 cases (35.1%), calcium and magnesium were seen in 3 cases (18%), but uric acid and urate were observed in 2 cases only (11.8%) [Table-1]

**Microscopic Finding**

The microscopic examination revealed the following finding as excessive RBC, Leucocytes, desquamated epithelial cells, epithelial casts, excessive mucous and fungal like elements was observed with desquamated cornified epithelial cells [Fig-1]. Crystals of calcium oxalate, calcium carbonate and also urate crystals were microscopically seen [Fig-2]

**Fungal detection**

Candida albicans was observed in culture on Sabouroud dextrose agar slant, also seen in the

Chromogen agar media which appeared with bluish green color and on Corn meal agar, candida albicans shows pseudohyphae, chlamydo spores and Blastoconia under the microscope [Fig-3]

**Abdominal Ultrasonography**

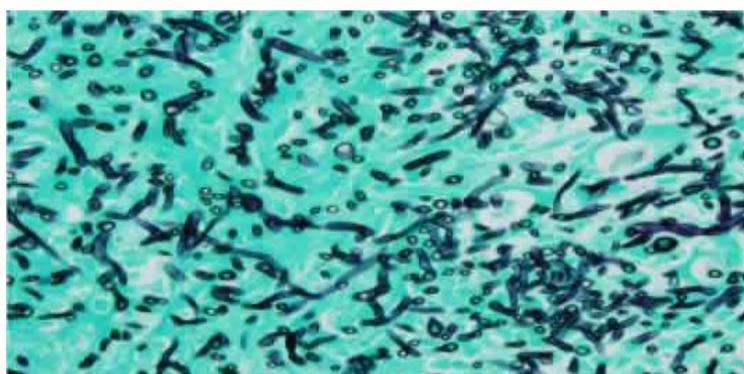
Abdominal Ultrasonography revealed the presence of renal stone in the 17 cases, the renal stone varied in size from 3mm to 0.5 cm, the renal stone may found in the right kidney or in left kidney or in both kidneys. The renal stone may located in the core of the kidney or in the middle layers or in the out layers, renal gravels may be also seen associated with renal stones [Fig-4].

**Water analysis**

The analysis of the drinking water from regions in which the urine samples were collected revealed that the patients which suffer from renal stone where drink hard water (160mg/L) or moderate hard water (110mg/L).

**Table 1 showing the chemical and morphological finding of 17 cases of kidney stones**

Chemical analysis			Morphological Analysis		
Component	Number of Cases	%	Component	Number of Cases	%
Calcium	6	35.1%	Calcium oxalate Monohydrate	6	35.1%
Oxalate	4	23.6%			
Phosphate	2	11.8%	Calcium oxalate Dehydrate	6	35.1%
Carbonate	1	5.9%			
Urate	1	5.9%	Uric acid & Urate	2	11.8%
Magnesium	1	5.9%	Calcium & magnesium	3	18%
Ammonium	2	11.8%			
Total	17	100%	Total	17	100%



**Fig-1: Showing fungal elements Blastoconidia and pseudohyphae surrounded by cornified desquamated epithelial cells H & E stain X 100**

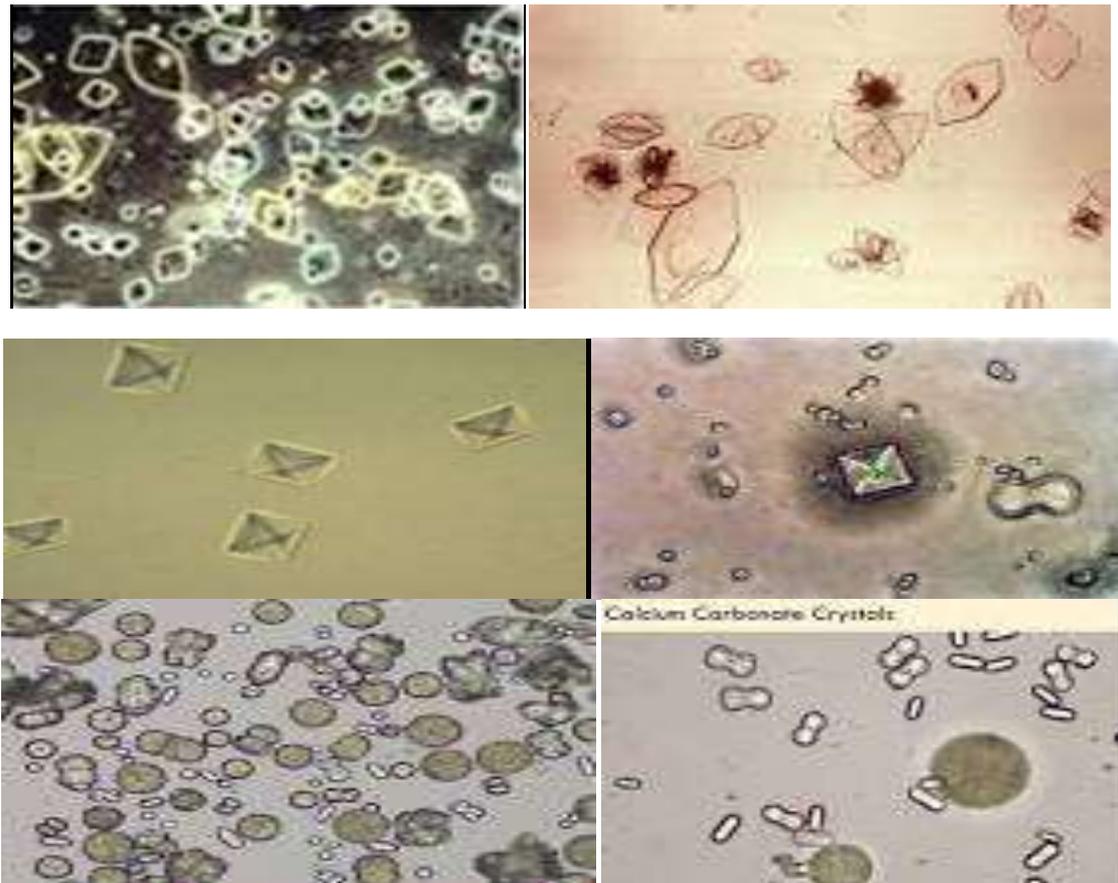


Fig -2 showing urate crystal, calcium oxalate crystal and calcium carbonate

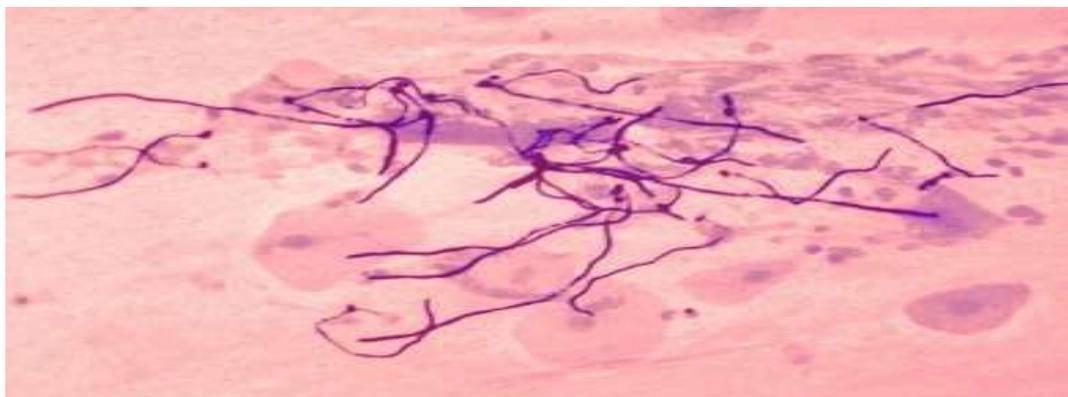


Fig-3 showing pseudohyphae and chlamydospore and Blastocidia stained by Gram stain X100.



Fig-3 Showing Calcium oxalate, ammonium phosphate renal stone

## DISCUSSION

In the present study the incidence of renal stones was (34%) from total examined cases, similar incidence was deducted also [27] who reported that the prevalence of kidney stones in USA rose by 37% between 1976 - 1980. Variable prevalence's were reported by many others they found 1-5% in Asia, 5-9% in Europe and 20% in Saudi Arabia [4,5,6] the prevalence variation based mainly on some factors as hot climate, life in desert and the type of drinking water.

From our results in this work we founded many physical changes in the collected urines samples as bad odor, dark yellow color, dysurea, frequency urination with or without history of diabetes mellitus, hypertension, renal failure, high salts in diet and our patients drinking hard or moderate hard ground water, from the available few others reported in the physical examination but [25] reported similar physical changes in urine associated with renal stones.

Many others discussed the chemical analysis of urine of patient suffering from renal stones [26], reported that the renal stones predominantly calcium oxalate (82%) but urate and uric acid (11.5%) and phosphate stones are only found in (5.8%) he also said that the main cause of these percentage were eat diet rich in purine and oxalate, hyperoxaluria, hypercalciuria and hypouricasuria were common [16], that the chemical analysis of 50 cases of average age 37 years revealed the following composition of the renal stones in Brazil (31%) calcium oxalate, oxalate + phosphate urate and oxalate + phosphate (21%) calcium urate (8%) and ammonium + magnesium (10%). Our results in the presents work were nearly similar to those obtain by the for mentioned others our results revealed that calcium was the main compound in 6 cases (35.1%), oxalate in 4 cases (23.6%), phosphate in 2 cases (11.8%), ammonium in 2 cases (11.8%) magnesium in one case (5.9%) and lastly urates in one case (5.9%), carbonate also observed in one case (5.9%).

Morphologically renal stones in the present work revealed that both calcium oxalate monohydrate and calcium oxalate dehydrate were the main component which represented by (35.1%) for each of them, calcium and magnesium was (18%) but uric acid and urate was (11.8%) only. These mentioned results were in agreement with the observations reported [16]. They found that calcium oxalate monohydrate (24%), calcium oxalate dehydrate (24%), uric acid urate (20%) calcium and magnesium (32%).

The microscopical finding in our work showed the following finding as increase RBC leucocytes, desquamated epithelial cells, epithelial cast, excessive mucous, similar microscopical finding were reported [29], he found excessive RBCs, leucocytes, and

desquamated epithelial cells, were associated with renal stone.

*Candida albicans* was observed in sabouroud dextrose agar slant and also appeared with bluish green color in Chromogen agar. *Candida albicans* also shows Pseudohyphae, Chlamydo spores and Blastoconidia on Corn meal agar, all these observations were also reported by [27]. They found that *Candida albicans* will appear as budding yeast 4-10  $\mu$ m in diameter, that often show formation hyphae elements. From our results the analysis of the drinking water by our patients revealed that they drinking had water (160mg/L) or moderately hard (110mg/L). The above mention results were in agreement with the finding which reported before [31].

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