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The Most Common Type of Kidney Stone and High Incidence in Males or Female

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ABSTRACT

In the renal calyces and pelvis, mineral deposits known as kidney stones can be found either loosely or firmly attached to the renal papillae. They comprise both crystalline and organic molecules and are produced when the urine is very saturated with a specific mineral. The majority of stones are mostly formed of calcium oxalate, and a lot of these stones form on Randall's plaques on the renal papillary floor, which are made of calcium phosphate. In the first five years after the initial stone episode, charges of up to 50% may recur. There are charges of up to 14.8% and increasing for stone creation. Risk factors for kidney stone development include obesity, diabetes, high blood pressure, and metabolic syndrome. Kidney stones can then lead to hypertension, chronic kidney disease, and end-stage renal disease. Less invasive endourological techniques have replaced open surgical lithotomy for the treatment of symptomatic kidney stones, reducing patient morbidity, increasing stone-free rates, and improving quality of life. Prevention of recurrence requires behavioral and nutritional adjustments in addition to drugs according to the kind of stone. The creation of stronger capsules and the pressing need for recurrence prevention necessitate a greater comprehension of the mechanisms behind stone formation.

ARTICLE DETAILS

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INTRODUCTION

The chronic and common condition known as renal stone disease is discussed in the Aphorisms of Hippocrates. [1] 15% of white males and 6% of all women experience one episode of renal stones over their lives, and 50% of those individuals experience another episode. Despite their urbanization, less than 1% of black South Africans noted renal stones. [2,3] Up to 75% of stones are composed of calcium oxalate, with struvite (10–20%) and uric acid coming in second and third, respectively. Only 5% of stones include more than 50% brushite (calcium monohydrogen phosphate) or hydroxyapatite, while less than 1% of stones contain cysteine. [4] Stone composition has to be examined using polarization microscopy since each type of stone has a unique treatment. Stones continue to cause significant morbidity from pain, urinary tract blockage, and infection despite significant progress in understanding the pathophysiological mechanisms underlying the disease, taking into account more effective diagnosis and treatment [5]. Pathogenesis To describe the concept of stone production, it is necessary to comprehend the mechanics of crystallization. Utilizing their concentrations, ions' states of saturation in a solution are controlled. For instance, stone formation starts with the association of minute quantities of crystalloid to form nuclei, while concentrations of calcium and oxalate reach saturation (the saturation product). These nuclei often form and congregate on surfaces made up of renal papillary epithelium and collecting ducts.[6] Crystals of calcium oxalate monohydrate are highly bound and internalized by renal epithelial cells. Events that follow crystal binding will be crucial in the pathogenesis of stones; specifically, cell responses are presumably important for the start of stone formation.[7,8]

Stone formation is fortunately prevented in mammalian urine by substances that block crystallization, and it occurs most effectively after the formation product (the metastable limit) has been exceeded. Therefore, only a supersaturated solution of calcium and oxalate will start to crystallize in undiluted human urine. Calculations of the urine's saturation with salts that might cause stones, such as calcium, phosphate, urate, and oxalate, are crucial for determining the urine's normal propensity to crystallize. [5]

Urinary saturation with calcium oxalate is commonplace within the standard populace so the function of other factors in stone formation ought to be critical. However, before discussion of inhibitory and selling materials, other essential factors need to be burdened. First, uric acid can precipitate in consistently acid urine, even inside the absence of

hyperuricaemia or hyperuricosuria. Second, uric acid can reason formation of calcium oxalate stones without being integrated into the crystals. The term salting out refers to this catalyst-like property, which works better in acid urine. Finally, many additional inhibitory or promoter responses depend significantly on urine pH. Stone promoters and inhibitors are lithogenic risk factors (panel 1). The effects of inhibitors on the development of stones have mostly been researched in calcium oxalate stones. The majority of inhibitors are anionic and appear to work by attaching to the calcium oxalate surface, however the specific structural processes by which this happens are not understood. [9]. This study was conducted to ascertain the prevalence and frequency of various kidney stone types in a group of patients as well as to identify potential preventative measures. Encouraging or directing and teaching the community at the importance of ingesting masses of water for the motive of stopping stones.

MATERIAL'S AND METHODS

In this study which was done in Al-refai general hospital in Thi-Qar, 121 patients were selected randomly (86 males and 35 females), they were about 30-50 years old and they complained a recurrent renal colic. Their stones were obtained after spontaneous passage of the stones or by using the medication, surgical removal or by lithotripsy after which biochemical analysis was done for all of the stones to determine their type.

The stones were washed then dried well and applied in test tube. An adequate amount of HNO3 was added for the tube, bubbles appeared which indicate the presence of carbonate moiety. Then the mixture boiled then cooled prior to get the precipitate (ppt.) which divided into four parts to proceed in the method as shown in figure 1

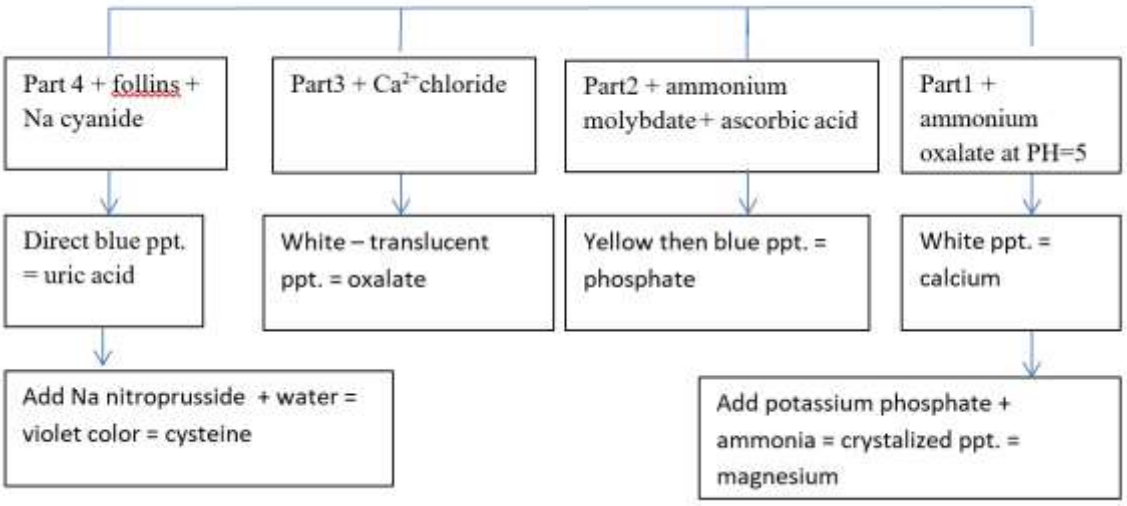

Figure (1) the biochemical analysis of renal stones.

RESULT

The isolation of stones groups that obtained from patients suffering with kidney stones then identification of each type was going and found that :

- the total number of stones with type of uric acid is 64 where it constitutes a proportion 52.9% of the total number of samples , and also found the incidence rate of occurrence in male is 70.312 % and in female 19 %.
- the total number of stones with type of calcium oxalate is 33 where it constitutes a proportion 27.8 % of the total number of samples and also found the incidence rate of occurrence in male is 69.7 % and in female 30.3 % .
- the total number of stones with type of Magnesium phosphate is 14 where it constitutes a proportion 11.5 % of the total number of samples , and also found the incidence rate of occurrence in male is 64.3 % and in female 35.7 % .
- the total number of stones with type of Cystine is 5 where it constitutes a proportion 4 % of the total number of samples , and also found the incidence rate of occurrence in male is 60 % and in female 40 % .
- the total number of stones with type of xanthen is 3 where it constitutes a proportion 2.5 % of the total number of samples , and also found the incidence rate of occurrence in male is 100 % .
- the total number of stones with type of mixed stones is 2 where it constitutes a proportion 1.65 % of the total number of samples and also found the incidence rate of occurrence in male is 100 % .

5.1 DISCUSSION

It is obvious that uric acid stones are the most common type that was found in this study. Uric acid precipitates in acid urine in excess production of uric acid is the primary risk factor for the formation of uric acid stones [22].

It was found that uric acid stone is the commonest type in both males and females. This is a particular because of the dietary habit in our society which consume a lot of amount of red meet and legumes which lead to increase purine load and subsequently hyperuricemia [23] . The male to female ratio was 3.2:1 which can be explained by the difference in the dietary habit between them .

CONCLUSIONS

It is clear that the most common type of kidney stone was uric acid stones with high incidence in males than female. The most important role in the occurrence of these stone was the food stuff which contains high amount of purines.

Another conclusion was a high incidence of struvite stone (are a common type of urinary or kidney stones that are made of magnesium ammonium phosphate (MgNHPO4·H2O),They make up around 10 to 15 percent of all kidney stones) which predict the importance of urinary tract infection as a causative agent.

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