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## EVALUATION OF DEHYDRATION SIGNS IN PATIENTS WITH NEPHROLITHIASIS (KIDNEY STONE)

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### ABSTRACT

#### Introduction

Nephrolithiasis (urinary system stone disease) is one of the most common urological diseases. The estimated incidence of nephrolithiasis ranges from 2% to 3%. Approximately 19% of urinary system stone patients have insufficient fluid intake. Increasing the amount of daily drinking water leads to the increase in urine volume, which is inversely proportional to decrease in the incidence of urinary system stones.

#### Aim of the Study

This study was planned to investigate dehydration, an indicator of water indispensable for our bodies, in patients who have been diagnosed with nephrolithiasis.

#### Results

Clinical biochemical tests (creatinine, sodium, potassium, chlorine and calcium) and density, erythrocyte and leukocyte data of urine were obtained randomly and retrospectively from 60 patients and 60 healthy controls diagnosed with nephrolithiasis at the Meram Medical Faculty Hospital. Urinary densities Ratio in nephrolithiasis patients was found to be  $1,017 \pm 0,08$  and  $1,018 \pm 0,023$  in healthy controls. As a result of the analysis of variance using SPSS 22.0 program, there was no statistically significant difference between the two groups in terms of urinary density and other data ( $p > 0,05$ ).

## Conclusions

Dehydration is known to be a risk factor for stone formation, and the normal urinary density of patients with nephrolithiasis in our study suggests that patients take into account the abundance of drinking water warnings after they have been diagnosed.

**Key words:** Nephrolithiasis, etiology, dehydration

## INTRODUCTION

Nephrolithiasis (urinary system stone disease) is one of the most common urological diseases. The estimated incidence of nephrolithiasis ranges from 2% to 3%. They are 2-3 times more common in males than females in adults, although the childhood age group have the same proportion in both sexes (10). The incidence of kidney stones has a marked geographical distribution. Turkey is located on the geographical belt called "stone belt", so kidney stones are common (2). However, knowledge about etiopathogenesis is still inadequate, although important studies have already been conducted in our country (2-6).

Approximately 19% of urinary system stone patients have insufficient fluid intake (16). Increasing the amount of daily drinking water leads to the increase in urine volume, which is inversely proportional to decrease in the incidence of urinary system stones. Increased water uptake and dilution of urine increases urinary ion activity and crystallization so diuresis reduces the formation of stones by shortening the residence time of the increased free crystal particles in the collecting system. Stone disease affects mostly the young adult or middle age population (range 20-50 years) (7). Nephrolithiasis tends to repeat frequently. The risk of recurrence in a person who once formed kidney stones is about 50% in 10 years and about 90% in 25 years (20). Environmental factors such as genetics are thought to be effective in stone formation (21). In children, the urinary tract stone disease is relatively less common than adults.

Geographical reasons indirectly affect the prevalence of kidney stone by the effect of temperature. During the summer months the incidence of urinary stone is high. Excess fluid loss by perspiration increases urine concentration and consequently the density of crystalloids. If there is not enough fluid intake, the urine volume is reduced, becoming more concentrated. Concentrated urine increases the bulk load and consequently, crystallization is facilitated. In the summer months, the formation of cysteine and uric acid stones is increased (11). The prevalence of urinary system stone disease may be as high as 12% in western countries and up to 20% in warm and dry climate geographical regions like Arab countries. In hot and sunny areas, calcium absorption and excretion of urine are increased by the effect of ultraviolet rays. Increased 1,25 dihydroxyvitamin D3 production in summer exposed to sunlight can cause an increase in urinary calcium (12).

2 liters per day or more of the fluid intake of the urinary system has been shown to reduce stone formation (13). If the urine volume is less than 1 liter per day, the risk of calcium oxalate stone formation significantly increases (14). In another study supporting the importance of fluid intake, it was shown that stone formation decreased by 86% when the daily urine volume was increased from 800 ml to 1200 ml (15). In urinary system stone patients, stone recurrence in the group with excessive daily fluid intake is reduced by half. The effect of water mineral content on stone formation should be controversial. Conflicting results have been reported in studies conducted in this area. (17) The type of liquid that is taken may affect stone formation. Studies have reported that orange juice and lemonade reduce the formation of stones by increasing the amount of urine citrate. Orange juice increases production of calcium phosphate stone and reduces undissolved uric acid in urine (18). There are studies that report that drinks such as tea coffee are also a risk factor for calcium oxalate Stone (19).



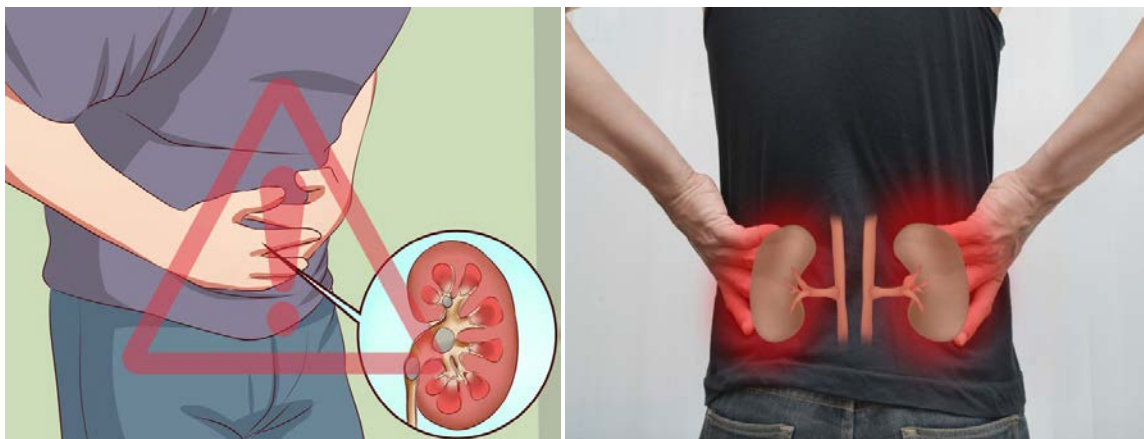
**Figure 1: Stone samples**

The kidney stones form by the crystallization of mineral or acid salts in our urine. Most of the stones leave your body while urinating. However, in some cases there may be a need for treatment to remove the stone. Stone formation occurs as a result of various physical and chemical events. Deficiencies of crystallization inhibitors (citrate, magnesium, pyrophosphate and glycosaminoglycans) can play a role in the formation of stone, such as calcium, oxalate, uric acid and cystine molecules may form stones when they become oversaturated. The acidic or alkaline pH of the urine can affect the association of the constituents of the kidney stones with each other and with the inhibitors. If the urine volume is less than 1 liter per day, the risk of calcium oxalate stone formation significantly increase.

This study was planned to investigate dehydration, an indicator of water indispensable for our bodies, in patients who have been diagnosed with nephrolithiasis.

#### **MATERIAL AND METHOD**

This study included 60 patients who had applied to Nephrology Clinic of Necmettin Erbakan University with renal calculi complaints such as flank pain, polakuria, hematuria between January 2013 and January 2016 and whose stones were removed from the body by various methods and sent to the laboratory for stone analysis. Kidney stones were manually analyzed by chemical method (BIOLABO Stone Analysis Set No: 92315 France).



**Figure 2: Kidney pain**

## RESULTS

Clinical biochemical tests (creatinine, sodium, potassium, chlorine and calcium) and density, erythrocyte and leukocyte data of urine were obtained randomly and retrospectively in 60 patients with nephrolithiasis and 60 healthy controls at Meram Medical Faculty Hospital. Urinary densities Ratio in nephrolithiasis patients was found to be  $1,017 \pm 0,08$  and  $1,018 \pm 0,023$  in healthy controls. As a result of the analysis of variance using SPSS 22.0 program, there was no statistically significant difference between the two groups in terms of urinary density and other data ( $p > 0,05$ ).

Various complex mechanisms, anatomical factors and infections play role in stone formation. Stone formation may occur when the precise balance impaire between the factors that trigger stone formation in the urinary system and the inhibitors. In the etiology of calcium-containing stones, which account for 70-80% of the stone, the over-height of the stone-building materials in the urine, as well as the lack of crystallization-inhibiting inhibitor take an important place.

There are two main epidemiological factors related to nephrolithiasis. First; Extrinsic factors (climate, living and working environment, drinking water and diet characteristics), and intrinsic factors (inherited, physiological, anatomical and racial characteristics of the person). The region factor includes many other factors such as dietary characteristics, environmental heat and moisture that are effective in stone formation.

Geographical reasons indirectly affect the prevalence of kidney stone by the effect of temperature. During the summer months the incidence of urinary stone is high. Excess fluid loss by perspiration increases urine concentration and consequently the density of crystalloids. In hot and sunny areas, intestinal calcium absorption and excretion with urine are increased by the effect of ultraviolet rays.

There is a significant effect of foods taken from different foods and beverages on the incidence of stone disease. So the excretion of purine, oxalate, calcium, phosphate and other elements taken in excess is increasing in urine. In countries with high economic levels, stone disease is more common. It has been argued that this is because of nutrition with animal protein-rich food. It is known that this type of feeding increases calcium, cAMP, hydroxyproline excretion in urine so that increased acid metabolites cause bone resorption, while reduce tubular reabsorbtion of calcium in kidneys. In addition, while this type of dietary habit increases calcium and uric acid in urine, it reduces citrate and bicarbonate.

## CONCLUSION AND SUGGESTIONS

As a result of our studies, nephrolithiasis was the most common disease affecting the urinary system and it was an important public health problem for Turkey located in the stone belt. As a result of our study, calcium oxalate stone was found 65% in patients who applied to our hospital. This suggests that stone formation in our region is not mostly related to amino acid metabolism. It is known that dehydration is a risk factor for stone formation, and the normal urinary density of patients with nephrolithiasis in our study suggests that patients take into account the abundance of drinking water warnings after they have been diagnosed.

Considering that hardness grade and mineral content of water, nutrient habits, age and gender are effective in the formation of stones, we think that detailed studies on the etiology of nephrolithiasis should be done and the society should be informed about this issue. As a result;

- Attention should be paid to changes in lifestyle such as
- More fluid consumption
- Observation of the diet
- Acquiring healthy habits.

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