



RESEARCH ARTICLE

BLOOD AND BIOCHEMISTRY STUDIES OF PATIENTS WITH RENAL STONE IN
WASIT GOVERNMENT

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ABSTRACT

Background: Is to study the glucose, hemoglobin, creatinine, red blood cell level, gender, age and blood white cell level in patients with kidney stones in a Wasit government.

Aims of study: Cross-sectional study of two groups of during the whole year, comparison between two groups; 1st group have kidney stones and the 2nd control group.

Patients and Method: the study was conducted on patients attending Zahra teaching Hospital and Karama teaching Hospital / Department of Surgery in Kut city for the period beginning from the September 2015 until the end of September 2016, The number of patients (60) were aged between 20-60 years and the number of males (40) and females (20) compared with healthy controls and numbered (24) aged between 20-60 years and the number of males (14) and females (10). In this study included estimate the concentrations of biochemical parameters : glucose, creatinine, HB, RBC, and WBC .

Results: Prevalence of kidney stones disease in Wasit government in males, is much more than twice the proportion among women (P <0.05) and the concentration of Glucose increased in people who suffer from a kidney stone disease compared with control group was Significantly increase (P <0.05) and also the concentration of creatinine in people who suffer from a kidney stone disease compared with control group (P <0.05) and the level of WBC in people who suffer from a kidney stone disease was increase compared with control group (P <0.05). while the concentration of Hb and also the level of RBC decreased in people who suffer from a kidney stone disease compared with control group (P <0.05), Also there was significant difference between gender and the ages of the patients with Kidney stone compared to healthy persons.

Conclusions: there was significant difference and increases the level of glucose, creatinine, WBC while decrease the level of Hb and RBC in patients with renal stone in comparison to control group.

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INTRODUCTION

Kidney stone disease also known as urolithiasis is one of the oldest and most common problems of the urinary system. urinary system is the body's drainage system for removing wastes and extra water (Basavaraj *et al.*, 2007). The urinary system includes two kidneys, two ureters, a bladder, and a urethra. Urine contains many dissolved minerals and salts, When your urine has high levels of these minerals and salts, you can form stones. A kidney stone is a solid piece of material that forms in a kidney when there are high levels of certain substances in the urine. These substances are normally found in the urine and do not cause problems at lower levels (Wesson *et al.*, 2003). A stone may stay in the kidney or travel down the urinary tract, Kidney stones vary in size. A small stone may pass on its own, causing little or no pain.

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A larger stone may get stuck along the urinary tract. A stone that gets stuck can block the flow of urine, causing severe pain or bleeding (Qaseem *et al.*, 2014 and Otunctemur *et al.*, 2014). The kidneys are two bean-shaped organs, Most people have two kidneys. They are located near the middle of the back, just below the rib cage, one on each side of the spine behind the liver, stomach, pancreas and intestines. Healthy kidneys clean waste from the blood and remove it in the urine. They control the levels of sodium, potassium and calcium in the blood. Every day, the two kidneys process about 200 quarts of blood to produce about 1 to 2 quarts of urine, composed of wastes and extra water (Rule *et al.*, 2009). The urine flows from the kidneys to the bladder through ureters. The bladder stores urine until releasing it through urination. When the bladder empties, urine flows out of the body through the urethra at the bottom of the bladder (Schulsinger *et al.*, 2014). Kidney stones can start small but can grow larger in size, If a stone grows to more than 5 millimeters it can cause blockage of the ureter resulting in severe pain in the lower back or abdomen, even filling the

inner hollow structures of the kidney (Miller, *et al.*, 2007). Finally, can Some stones stay in the kidney, and do not cause any problems. Sometimes, the kidney stone can travel down the ureter between the kidney and the bladder. If the stone reaches the bladder, it can be passed out of the body in urine. If the stone becomes lodged in the ureter, it blocks the urine flow from that kidney and causes pain (Morgan *et al.*, 2008).

Types Kidney stones

Calcium stones

Calcium stones are the most common type of kidney stone (80 percent of stones). There are two types of calcium stones: calcium oxalate and calcium phosphate (Punnoose *et al.*, 2012). Calcium oxalate is by far the most common type of calcium stone. Some people have too much calcium in their urine, raising their risk of calcium stones. Even with normal amounts of calcium in the urine, calcium stones may form for other reasons (Evan *et al.*, 2003 and Matlaga *et al.*, 2007).



Uric acid stones

Uric acid stones are (5–10 percent of stones), a waste product that comes from chemical changes in the body. Uric acid crystals do not dissolve well in acidic urine and instead will form a uric acid stone. Having acidic urine may come from: Being overweight, Chronic diarrhea, Type 2 diabetes (high blood sugar), Gout, diet that is high in animal protein and low in fruits and vegetables (Taylor *et al.*, 2009).



Struvite stones: chronic urinary tract infection

Struvite stones are not a common type of stone (10 percent of stones). These stones are related to chronic urinary tract infections (UTIs). Some bacteria make the urine less acidic and more basic or alkaline. Magnesium ammonium phosphate (struvite) stones form in alkaline urine (Dardamanis, 2013). These stones are often large, with branches, and they often grow very fast. People who get chronic UTIs, such as those with long-term tubes in their kidneys or bladders, or people with poor bladder emptying due to neurologic disorders are at the highest risk for developing these stones (Dursun *et al.*, 2015).

Cystine stones

Cystine stones are (less than 1 percent of stones), is amino acid that in certain foods; it is one of the building blocks of protein. Cystinuria (too much cystine in the urine) is a rare. Inherited metabolic disorder, It is when the kidneys do not reabsorb cystine from the urine. When high amounts of cystine are in the urine, it causes stones to form. Cystine stones often start to form in childhood (Andrew *et al.*, 2011).



Kidney Stones symptoms

Stones in the kidney often do not cause any symptoms and can go undiagnosed. When a stone leaves the kidney, it travels to the bladder through the ureter. Often the stone can become lodged in the ureter. When the stone blocks the flow of urine out of the kidney, it can cause the kidney to swell (hydronephrosis), often causing a lot of pain (Preminger *et al.*, 2005). Common symptoms of kidney stones are: A sharp, cramping pain in the back and side, often moving to the lower abdomen or groin. Some women express the pain is worse than childbirth labor pains. The pain often starts suddenly and comes in waves (Matlaga *et al.*, 2007). It can come and go as the body tries to get rid of the stone. A feeling of intense need to urinate. Urinating more often or a burning feeling during urination. Urine that is dark or red due to blood. Sometimes urine has only small amounts of red blood cells that can't be seen with the naked eye, Nausea and vomiting. Men may feel pain at the tip of their penis (Schichor *et al.*, 2014).

Experimental Design

This study was conducted in Zahra Teaching Hospital and Karama Teaching Hospital in the city of Kut, since the beginning of the month of September 2015 until the end of September 2016 were included in the study follow-up (60) cases of patients with kidney stones auditors of the hospital during this period after confirming there is no case other conditions can affect the results, were divided into two groups:

Group I: a patient group included follow-up (60) the case of patients who suffer from the presence of stones in the kidney.

Divided into 40 male patients and 20 female patients.

This group has been divided into two categories according to their age included:

- The first age group ranged between (20-40) years included 14 females, 10 males.
- The second age group ranged between (41-60) years included 6 females, 30 males.

The situation was determined by the patient's examination by a specialist doctor and observe clinical signs and forwarded to

the laboratory unit at the hospital for the purpose of conducting special examinations.

Group II: a control group included (24) people were divided by age:

- The first age group ranged between (20-40) years included 6 females, 4 males.
- The second age group ranged between (41-60) years included 4 females, 10 males.

study. The glucose level of each individual was carried out by using a glucometer (Accu-Check Active, Roche Company). Concentrations of creatinine were estimated by the direct kit method.

Statistical analysis

Statistical analysis was performed with SPSS software. Data were analyzed using analysis of paired-samples T-test for comparison between different group. Results were reported as mean \pm S.E. and differences were considered as significant when ($P < 0.05$).

Table 1. Concentrations standards for patients and healthy controls (Mean \pm S.E.)

Parameters	Control Group (Mean \pm S.E.) N=24	Patient Group (Mean \pm S.E.) N=60
Glucose	108.0 \pm 1.311 *	192.29 \pm 12.613 *
Creatinine	0.95 \pm 0.03 *	1.45 \pm 0.16 *
HB	15.16 \pm 0.31 *	12.00 \pm 0.35 *
RBC	5.59 \pm 0.20 *	4.61 \pm 0.10 *
WBC	5.52 \pm 0.22 *	14.35 \pm 0.56 *

*: Means significant difference between the two groups when ($P < 0.05$).

Table 2. The results of the effect of gender on the concentrations standards for patients and healthy controls (Mean \pm S.E.)

Parameters	Control Group (Mean \pm S.E.)		Patient Group (Mean \pm S.E.)	
	Male N=14	Female N=10	Male N=40	Female N=20
Glucose	106.285 \pm 1.905 _a	110.400 \pm 1.454 _a *	161.300 \pm 4.320 _a	209.950 \pm 14.145 _b *
Creatinine	1.20 \pm 0.05 _a *	1.57 \pm 0.82 _a	2.13 \pm 0.15 _a *	1.24 \pm 0.13 _b
HB	16.3 \pm 0.14 _a *	13.50 \pm 0.14 _b *	14.75 \pm 0.17 _a *	9.52 \pm 0.31 _b *
RBC	6.38 \pm 0.01 _a *	4.48 \pm 0.11 _b	4.98 \pm 0.09 _a *	3.89 \pm 0.13 _b
WBC	5.40 \pm 0.23 _a *	5.70 \pm 0.41 _a	17.03 \pm 0.20 _a *	8.98 \pm 0.69 _b

*: Means significant difference between the two groups when ($P < 0.05$).

a,b : Means with different superscript letters are significantly different ($P < 0.05$).

Table 3. The results of the effect of age on the concentrations standards for patients and healthy controls (Mean \pm S.E.)

Parameters	Control Group (Mean \pm S.E.)		Patient Group (Mean \pm S.E.)	
	year20-40 N=10	year41--60 N=14	year20-40 N=24	year41--60 N=36
Glucose	103.200 \pm 2.194 _a *	111.428 \pm 0.816 _b *	155.458 \pm 8.769 _a *	192.222 \pm 7.705 _b *
Creatinine	0.87 \pm 0.08 _a	1.70 \pm 0.56 _a	1.54 \pm 0.19 _a	2.04 \pm 0.15 _a
HB	14.65 \pm 0.48 _a *	15.52 \pm 0.38 _a *	11.38 \pm 0.59 _a *	14.09 \pm 0.34 _b *
RBC	5.11 \pm 0.36 _a *	5.93 \pm 0.18 _a *	3.76 \pm 0.07 _a *	5.18 \pm 0.06 _b *
WBC	5.55 \pm 0.46 _a *	5.51 \pm 0.20 _a *	12.17 \pm 0.72 _a *	15.80 \pm 0.70 _a *

*: Means significant difference between the two groups when ($P < 0.05$).

a,b : Means with different superscript letters are significantly different ($P < 0.05$).

Blood collection and laboratory investigation

The skin was cleaned thoroughly and sterilized with 70% isopropyl alcohol swab and dried before withdrawing peripheral blood by a 5 cc disposable syringe from enrolled subjects. The blood was transferred to an ethylenediamine tetra acetic acid (EDTA) tube test coated purple-top. The blood was mixed in the test tubes and immediately taken to the laboratory for examination. White blood cells (WBC), Red blood cells (RBC), Hemoglobin (Hb), were measured in this

RESULTS

In the current study showed results of Glucose, Creatinine, WBC were significant higher ($p < 0.05$) in group patient with kidney stone a mean (192.29 \pm 12.613), (1.45 \pm 0.16), (14.35 \pm 0.56) when compared to the control group a mean (108.0 \pm 1.311), (0.95 \pm 0.03), (5.52 \pm 0.22). Table (1). While the concentrations of Hb and RBC showed significant decrease ($p < 0.05$) in group patient with kidney stone a mean (12.00 \pm 0.35), (4.61 \pm 0.10) when compared to the control group a

mean (15.16 ± 0.31), (5.59 ± 0.20), Frequency compared to the control group, showed in Table (1). In this study when compared the effect of gender on the concentrations of parameters at ($p < 0.05$): showed in table (2). The results was increase the level of glucose in female patients with renal stone (209.950 ± 14.145) more than that in males with renal stones (161.300 ± 4.320), while the level of creatinine, Hb, RBC and WBC was increased more in males with renal stones (2.13 ± 0.15 , 14.75 ± 0.17 , 4.98 ± 0.09 , 17.03 ± 0.20) respectively than that in females with renal stones (1.24 ± 0.13 , 9.52 ± 0.31 , 3.89 ± 0.13 , 8.98 ± 0.69) respectively. Also In this study when compared to the effect of age on the concentrations of parameters at ($p < 0.05$): showed in Table (3). There was significant increases in the level of glucose, creatinine, Hb, RBC and level of WBC in group of patients aged (41-60 year) (192.222 ± 7.705 , 2.04 ± 0.15 , 14.09 ± 0.34 , 5.18 ± 0.06 , 15.80 ± 0.70) respectively in compared with age group (20-40 year) (155.458 ± 8.769 , 1.54 ± 0.19 , 11.38 ± 0.59 , 3.76 ± 0.07 , 12.17 ± 0.72) respectively.

DISCUSSION

In our study showed the higher prevalence of stone formers ranging from Year-(41y-60y) and more in male gender than female gender which is supported by the study (Ahmad. and Shad, 2016) , and also we found increased prevalence of renal stone in male gender more than that in female which is also supported in other study (Ahmad and Shad, 2016) and also in (Victoriano *et al.*, 2010). In our study we find the level of blood glucose, level of WBC and serum creatinine was significantly increase ($p < 0.05$) and this similar to other studies (Lieske *et al.*, 2006 and Sfoungaristos *et al.*, 2012) and (Andrew *et al.*, 2011) studies respectively. While in our study we find the level of Hb and RBC level is lower than that with control group ($p < 0.05$) which is differ from other studies where the level of RBC and even the Hb was elevated in patient with renal diseases as study (Simone *et al.*, 2007) and this may be due to complication of renal stone which can cause hematuria and so frequent blood loss cause anemia.

Conclusion

We conclude that the renal stone patients are strongly associated with increased age and male gender and increase level of blood glucose, creatinine, WBC while lower of Hb level and RBC level.

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