

# Comparative Study for the Effect of Tamsulosin on Biomarkers between Renal and Urethral Stone Lithotripsy

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## Abstract:

Nephrolithiasis are multi-factorial diseases that result from the combined influence of epidemiological, biochemical and genetically risk factors. Defective drainage due to urinary tract obstruction at the narrowest part (ureterovesical junction, ureteropelvic junction, and near the pelvic brim) via stones will eventually cause the agonizing renal colic pain. Therapeutic managements of nephrolithiasis to relief acute colic pain are the primary objective. Non-steroidal anti-inflammatory drugs are the most commonly used drugs as suggested by many studies. It is very important to consider side effects of the drugs used in the treatment of colic pain.

In order to preserve renal function and to relief obstruction, medical expulsion therapy are used for urethral calculi as a conservative management. These medications will aid the passage urethral calculi, an area that currently seems to be a field for continuous investigation.

**Keywords:** Renal stones, Urethral stones, Lithotripsy, Tamsulosin.

## Introduction:

Nephrolithiasis is multi-factorial diseases that result from the combined influence of epidemiological, biochemical and genetically risk factors. The prevalence of nephrolithiasis is approximately 2-3 % in the general population, and the estimated lifetime risk is approximately 12 % for white males <sup>(1)</sup>. Urinary stones have high recurrence rates approach 50% at 10 years <sup>(2)</sup>. Urinary stone diseases are 2-3 times more common in males than in females. It occurs more often in adults than in elderly patients, and more often in elderly than in children. White individual are affected more than Asian ethnicity, who are affected more than blacks. In addition, renal stone diseases occur more frequently in hot, arid areas than in temperate regions. Decreased fluid intake and consequent urine concentration are among the most important factors affecting stone formation. Certain medications are associated with increased risk of urolithiasis. Dietary oxalate is another possible cause, but the role of dietary calcium is less clear, and calcium restriction is no longer universally recommended <sup>(3)</sup>. Although mortality from urinary stone diseases is rare, there is a significant rate (28%) of renal deterioration with certain stone types <sup>(4)</sup>.

## Materials and Methods:

### Patients:

Total of 80 patients with renal and urethral stones, admitted in Al-Yarmouk teaching hospital in Baghdad, Iraq from November 2013 to October 2014 were included in the study. The Ethics Committee of College of Pharmacy/ Al-Mustansiriyah University approved the study.

The study population consists of 80 patients enrolled according certain specification, and then subdivided into four groups:

**Group I:** Include 20 patients with renal stone taking no medication & treated with lithotripsy.

**Group II:** Include 20 patients with renal stone starting tamsulosin therapy for 14 days & then treated with lithotripsy.

**Group III:** Include 20 patients with urethral stone taking no medication & treated with lithotripsy.

**Group IV:** Include 20 patients with urethral stone starting tamsulosin therapy for 14 days & then treated with lithotripsy.

These subgroups were matched with each other regarding to: age, gender, stone locations, stone size, no co existing chronic diseases and smoking state.

The therapy regimen was one capsule of tamsulosin hydrochloride (0.4 mg) once daily for 14 days followed by extracorporeal shock wave lithotripsy for each sample groups, and there were no missing values among the study samples.

We exclude, adolescents <18 years and elderly >60 years, patient with nephrostomy, urinary tract infection (UTI), using  $\alpha$ -blocker before or have contra-indication to tamsulosin and any other co-existing diseases.

#### Materials:

##### A- Chemicals and Kits:

The following diagnostic kits were used in the study, which are listed with their suppliers (Table 1).

Table (1): Diagnostic Kits or Chemical

Diagnostic Kits or chemical	Supplier	Origin
Serum urea Enzymatic Kit	Linear chemicals	Spain
Serum Creatinine Enzymatic Kit	Linear chemicals	Spain
Serum Sodium Enzymatic Kit	Stanbio Laboratory	USA
Serum Chloride Enzymatic Kit	CHEMetrics	USA
Serum Potassium Reflotron® Kit	Roche	USA
Alkaline Phosphatase Reflotron® Kit	Roche	USA
Kidney Injury Molecule no. 1 ELISA Kit	Cusabio	China
Tamsulosin (Omnice®)	Astellase	Netherland

##### B- Instruments:

The main instruments, devices and tools that were used during the study are listed with their suppliers (Table 2).

Table (2): Instruments.

Instruments	Suppliers	Origin
Water bath	KK	Malaysia
Centrifuge	KK	Malaysia
Ultraviolet – visible spectrophotometer	Apel DP 303	Japan
Reflotron	Roche	USA
Lithotripter	Storz	Switzerland

#### Methods:

##### A- Diagnostic Methods:

Patients are evaluated by:

1. Routine urinalysis and microscopy.
2. Renal function tests.
3. X-ray kidney urethra and urinary bladder (KUB),
4. Intravenous urography.
5. Ultrasonography (USG).
6. When it needed, computed tomography of the urinary tract performed in addition to ultrasonography<sup>(5)</sup>.

##### B- Preparation of the Patients for ESWL:

Because intestinal gas and bowel contents interfere with localization of the stone, Bowel was prepared with laxatives. Patients need to restrict solid diet for one day prior to treatment to stop the buildup of gas in the bowel. This is to ensure a clear picture of stone is visible during treatment.<sup>(6,7)</sup> A SLX-F2 machine equipped with a cylindrical electromagnetic shock wave source (Storz Medical, Tuttlingen, Switzerland) was used to perform lithotripsy.<sup>(8,9)</sup>

All 80 patients received 3000 shocks, session last about (30 – 45 minutes) initially at 7.7 which was gradually increased to 9 kV within 500 initial shocks with a mean frequency of 1.5 Hz with a variable focus. The main parameters (renal biomarkers) were measured include: sodium (Na<sup>+</sup>), potassium (K<sup>+</sup>), chloride (Cl<sup>-</sup>), alkaline phosphatase (ALP), blood urea (bl. urea), serum creatinine (S.Cr) and kidney injury molecules no. 1 (KIM-1).

**C- Sample collection and preparation:**

Five milliliters (5 ml) of venous blood samples were drawn from each patient before starting therapy for each group and after 1 hour post ESWL (after 1 week from the 1<sup>st</sup> sample for group I, III. And after 2 weeks from the 1<sup>st</sup> sample for group II, IV). The blood specimens were collected from patients and healthy individuals. The collected samples were transferred into clean plain test tubes, left at room temperature (25°C) for at least 15 minutes to clot, then centrifuged at 3000 r.p.m. and the serum was extracted to be used for biochemical assessments. The measured parameters include: Sodium, Potassium, Chloride, Alkaline phosphatase, Urea, Serum Creatinine and Kidney injury molecules no. 1 levels.

**Statistical Analysis:**

For data encoding and analysis; SPSS (statistical package for social science version 16.0, SPSS Inc. Chicago, Illinois, USA) was used and the test of significance association was done by one way ANOVA tests and the cutoff point of significance was (< 0.05) *P* value.

**Results and Discussion:**

**Demographic and Baseline Characteristics:**

From (table 3); there were no significant differences (*p* value > 0.05) among groups of the study sample and it was matched in regarding age, gender, stone size and smoking variables.

Table (3): Demographic and baseline characteristics of the population study.

Variables		Groups					
		I	II	<i>P</i> value	III	IV	<i>P</i> value
Age (Years)	Mean	36.5 <sup>a</sup>	37.3 <sup>a</sup>	> 0.05	38.9 <sup>a</sup>	37.55 <sup>a</sup>	> 0.05
	SD	±5.25	±6.35		±4.44	±5.72	
Gender	♂ %	49% <sup>a</sup>	55% <sup>a</sup>	> 0.05	65% <sup>a</sup>	70% <sup>a</sup>	> 0.05
	♀ %	51% <sup>a</sup>	45% <sup>a</sup>		35% <sup>a</sup>	30% <sup>a</sup>	
Stone Size (mm)	Mean	15.45 <sup>a</sup>	14.8 <sup>a</sup>	> 0.05	6.9 <sup>a</sup>	7.1 <sup>a</sup>	> 0.05
	SD	±1.66	±1.93		±1.41	±1.61	
Smoking State	Smoker %	60% <sup>a</sup>	55% <sup>a</sup>	> 0.05	45% <sup>a</sup>	50% <sup>a</sup>	> 0.05
	Non-Smoker %	40% <sup>a</sup>	45% <sup>a</sup>		55% <sup>a</sup>	50% <sup>a</sup>	

Identical superscript letters (a,a) represent no significant difference (*p*>0.05),

**The effect of ESWL alone, ESWL and tamsulosin on biomarkers within renal stone groups:**

To assess the effect of the ESWL alone, ESWL and tamsulosin on blood urea, serum creatinine, alkaline phosphatase, blood ions and KIM-1, one way ANOVA test, and paired sample t test were used within renal stone groups (group I & group II), (Table 4).

Table (4): The effect of ESWL alone, ESWL and tamsulosin on biomarkers within renal stone groups

Variables	Renal groups patients			
	Mean	I	II	P value
Bl. Urea mg/dL	Pre- treatment	41.55 <sup>a</sup>	38.95 <sup>a</sup>	> 0.05
	Post- treatment	38.35 <sup>a</sup>	27.75 <sup>b*</sup>	< 0.05
	P value	> 0.05	< 0.05	
S. Cr mg/dL	Pre- treatment	1.06 <sup>a</sup>	0.90 <sup>a</sup>	> 0.05
	Post- treatment	0.89 <sup>a</sup>	0.59 <sup>b*</sup>	< 0.05
	P value	> 0.05	< 0.05	
S. Na <sup>+</sup> mmol/L	Pre- treatment	142.8 <sup>a</sup>	145.45 <sup>a</sup>	> 0.05
	Post- treatment	137.45 <sup>a</sup>	131.85 <sup>a*</sup>	> 0.05
	P value	> 0.05	< 0.05	
S. Cl <sup>-</sup> mmol/L	Pre- treatment	106.25 <sup>a</sup>	108.6 <sup>a</sup>	> 0.05
	Post- treatment	102.25 <sup>a</sup>	99.3 <sup>a*</sup>	> 0.05
	P value	> 0.05	< 0.05	
S. K <sup>+</sup> mmol/L	Pre- treatment	3.74 <sup>a</sup>	5.07 <sup>b</sup>	< 0.05
	Post- treatment	3.65 <sup>a</sup>	4.1 <sup>a*</sup>	> 0.05
	P value	> 0.05	< 0.05	
ALP U/L	Pre- treatment	97.7 <sup>a</sup>	107 <sup>a</sup>	> 0.05
	Post- treatment	98.4 <sup>a</sup>	90.7 <sup>b*</sup>	< 0.05
	P value	> 0.05	< 0.05	
KIM-1 ng/ml	Pre- treatment	3.55 <sup>a</sup>	3.40 <sup>a</sup>	> 0.05
	Post- treatment	3.60 <sup>a</sup>	2.71 <sup>b*</sup>	< 0.05
	P value	> 0.05	< 0.05	

Identical superscript letters (a,a) represent no significant difference ( $p > 0.05$ ), Non-identical superscripts (a,b) represent significant difference ( $p < 0.05$ ), (\*) means significant difference ( $p < 0.05$ ) when compare within pre & post treatment.

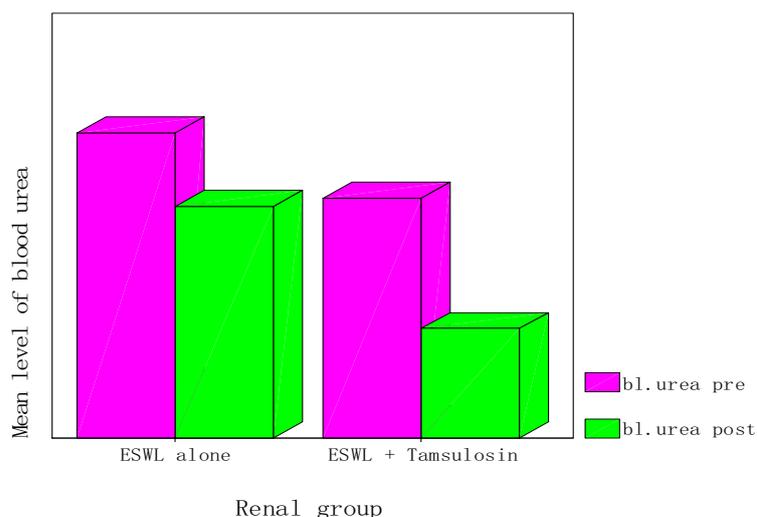


Figure (1): The effect of ESWL alone, ESWL and tamsulosin on serum urea within renal stone groups.

Identical superscript letters (a,a) represent no significant difference ( $p>0.05$ ), Non-identical superscript letters (a,b) represent significant difference ( $p<0.05$ ), (\*) means significant difference ( $p<0.05$ ) when compare within pre & post treatment.

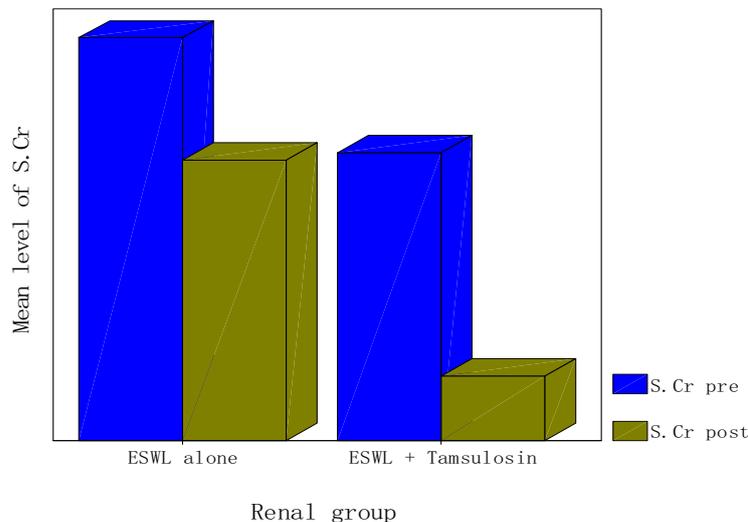


Figure (2) The effect of ESWL alone, ESWL and tamsulosin on serum creatinine within renal stone groups.

Identical superscript letters (a,a) represent no significant difference ( $p>0.05$ ), Non-identical superscript letters (a,b) represent significant difference ( $p<0.05$ ), (\*) means significant difference ( $p<0.05$ ) when compare within pre & post treatment.

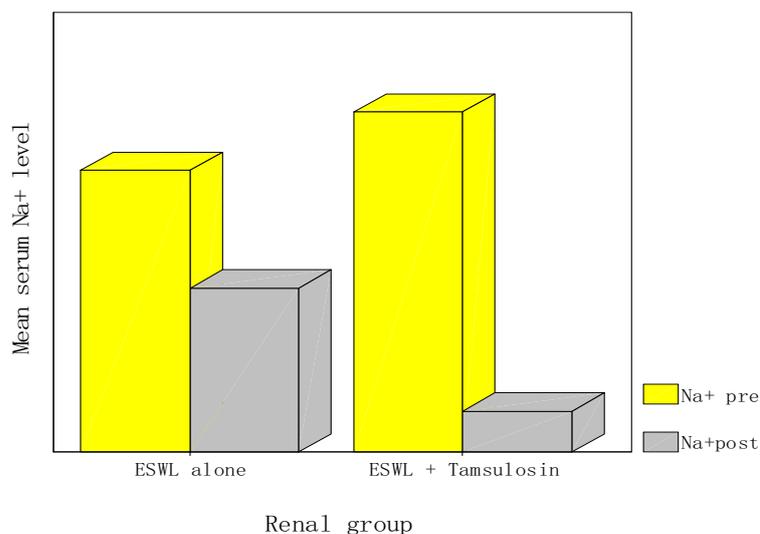


Figure (3): The effect of ESWL alone, ESWL and tamsulosin on serum sodium within renal stone groups.

Identical superscript letters (a,a) represent no significant difference ( $p>0.05$ ), Non-identical superscript letters (a,b) represent significant difference ( $p<0.05$ ), (\*) means significant difference ( $p<0.05$ ) when compare within pre & post treatment.

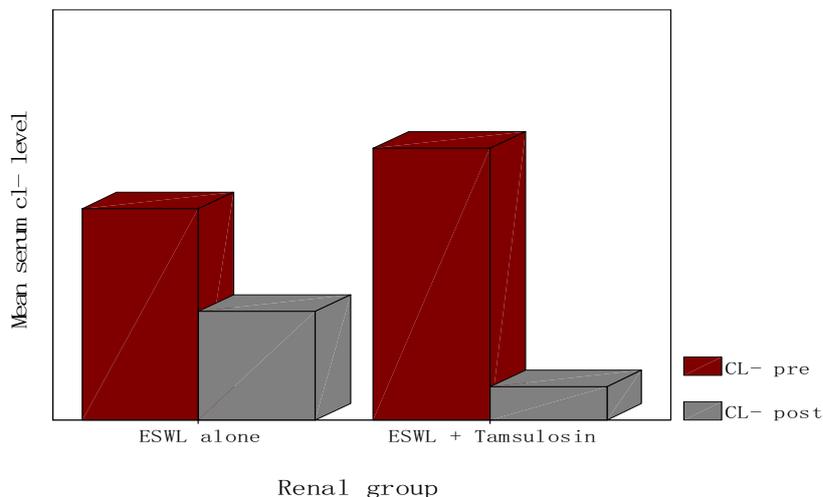


Figure (4): The effect of ESWL alone, ESWL and tamsulosin on serum chloride within renal stone groups.

Identical superscript letters (a,a) represent no significant difference ( $p > 0.05$ ), Non-identical superscript letters (a,b) represent significant difference ( $p < 0.05$ ), (\*) means significant difference ( $p < 0.05$ ) when compare within pre & post treatment.

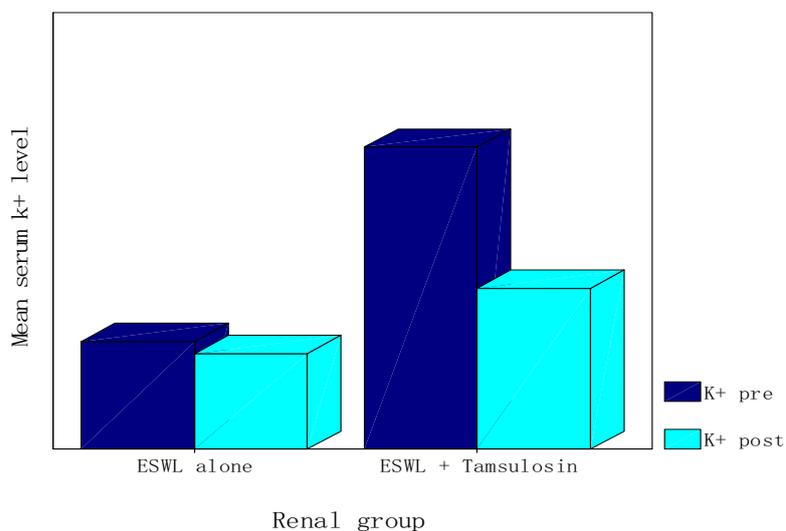


Figure (5): The effect of ESWL alone, ESWL and tamsulosin on serum potassium within renal stone groups.

Identical superscript letters (a,a) represent no significant difference ( $p > 0.05$ ), Non-identical superscript letters (a,b) represent significant difference ( $p < 0.05$ ), (\*) means significant difference ( $p < 0.05$ ) when compare within pre & post treatment.

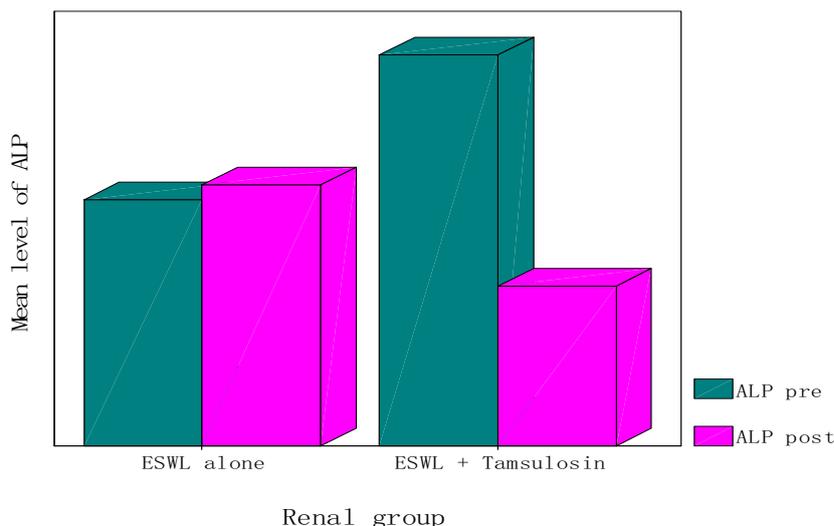


Figure (6): The effect of ESWL alone, and ESWL and tamsulosin on serum ALP within renal stone groups.

Identical superscript letters (a,a) represent no significant difference ( $p>0.05$ ), Non-identical superscript letters (a,b) represent significant difference ( $p<0.05$ ), (\*) means significant difference ( $p<0.05$ ) when compare within pre & post treatment.

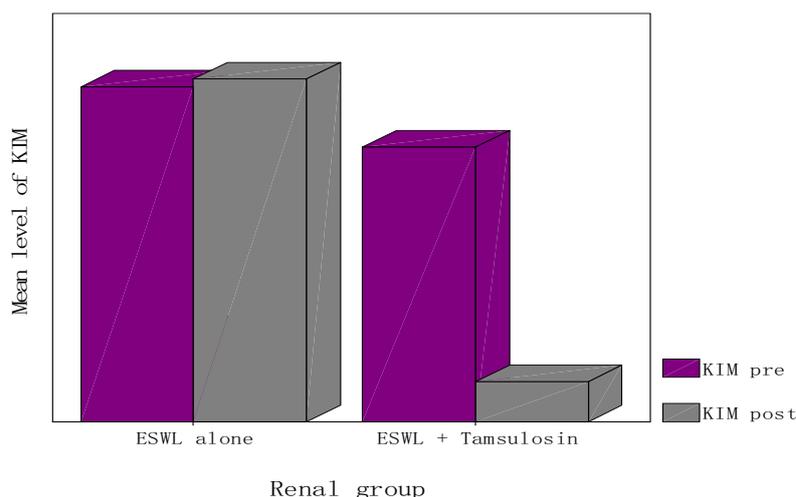


Figure (7): The effect of ESWL alone, and ESWL and tamsulosin on serum KIM-1 within renal stone groups.

Identical superscript letters (a,a) represent no significant difference ( $p>0.05$ ), Non-identical superscript letters (a,b) represent significant difference ( $p<0.05$ ), (\*) means significant difference ( $p<0.05$ ) when compare within pre & post treatment.

**The effect of ESWL alone, ESWL and tamsulosin on biomarkers within ureteral stone groups:**

To assess the effect of the ESWL alone, ESWL and tamsulosin on blood urea, serum creatinine, alkaline phosphatase, blood ions and KIM-1, one way ANOVA test, and paired sample t test were used within urethral stone groups (group III & group IV), (Table 5).

Table (5): The effect of ESWL alone, ESWL and tamsulosin on biomarkers within urethral stone groups

Variables	Ureteral group patients			
	Mean	III	IV	P value
Bl. Urea mg/dL	Pre- treatment	48.75 <sup>a</sup>	47.6 <sup>a</sup>	> 0.05
	Post- treatment	43.75 <sup>a*</sup>	36.35 <sup>b*</sup>	< 0.05
	P value	< 0.05	< 0.05	
S. Cr mg/dL	Pre- treatment	1.31 <sup>a</sup>	1.16 <sup>a</sup>	> 0.05
	Post- treatment	1.12 <sup>a*</sup>	0.77 <sup>b*</sup>	< 0.05
	P value	< 0.05	< 0.05	
S. Na <sup>+</sup> mmol/L	Pre- treatment	138.65 <sup>a</sup>	152.45 <sup>b</sup>	< 0.05
	Post- treatment	129.9 <sup>a</sup>	131.1 <sup>a*</sup>	> 0.05
	P value	> 0.05	< 0.05	
S. Cl <sup>-</sup> mmol/L	Pre- treatment	117.7 <sup>a</sup>	121.2 <sup>a</sup>	> 0.05
	Post- treatment	111.1 <sup>a</sup>	106.9 <sup>a*</sup>	> 0.05
	P value	> 0.05	< 0.05	
S. K <sup>+</sup> mmol/L	Pre- treatment	4.33 <sup>a</sup>	5.02 <sup>a</sup>	> 0.05
	Post- treatment	3.95 <sup>a</sup>	4.12 <sup>a*</sup>	> 0.05
	P value	> 0.05	< 0.05	
ALP U/L	Pre- treatment	100 <sup>a</sup>	101.95 <sup>a</sup>	> 0.05
	Post- treatment	100 <sup>a</sup>	84.25 <sup>b*</sup>	< 0.05
	P value	> 0.05	< 0.05	
KIM-1 ng/ml	Pre- treatment	2.48 <sup>a</sup>	2.58 <sup>a</sup>	> 0.05
	Post- treatment	2.47 <sup>a</sup>	1.65 <sup>b*</sup>	< 0.05
	P value	> 0.05	< 0.05	

Identical superscript letters (a,a) represent no significant difference ( $p > 0.05$ ), Non-identical superscript letters (a,b) represent significant difference ( $p < 0.05$ ), (\*) means significant difference ( $p < 0.05$ ) when compare within pre & post treatment.

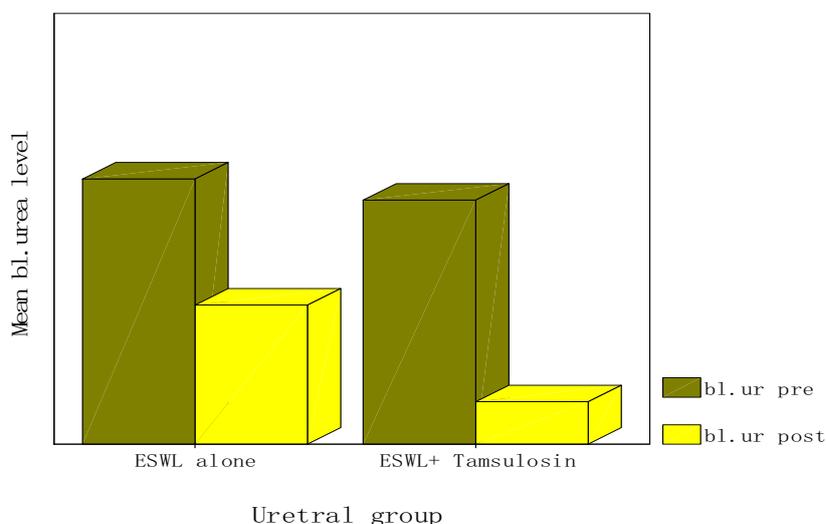


Figure (8): The effect of ESWL alone, ESWL and tamsulosin on serum urea within urethral stone groups.

Identical superscript letters (a,a) represent no significant difference ( $p>0.05$ ), Non-identical superscript letters (a,b) represent significant difference ( $p<0.05$ ), (\*) means significant difference ( $p<0.05$ ) when compare within pre & post treatment.

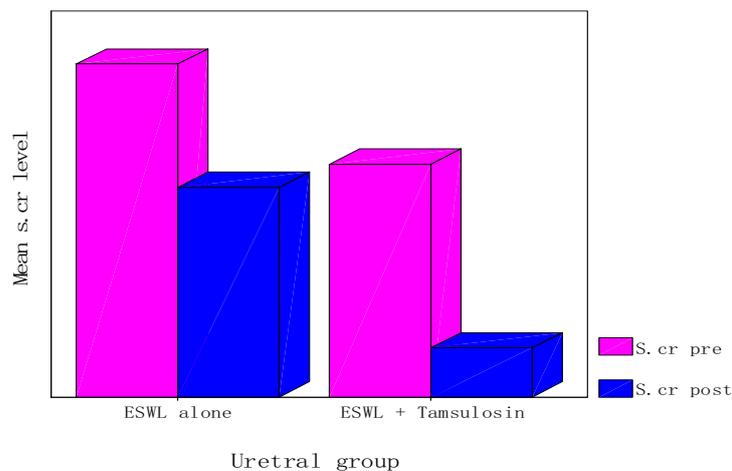


Figure (9): The effect of ESWL alone, ESWL and tamsulosin on serum creatinine within urethral stone groups.

Identical superscript letters (a,a) represent no significant difference ( $p>0.05$ ), Non-identical superscript letters (a,b) represent significant difference ( $p<0.05$ ), (\*) means significant difference ( $p<0.05$ ) when compare within pre & post treatment.

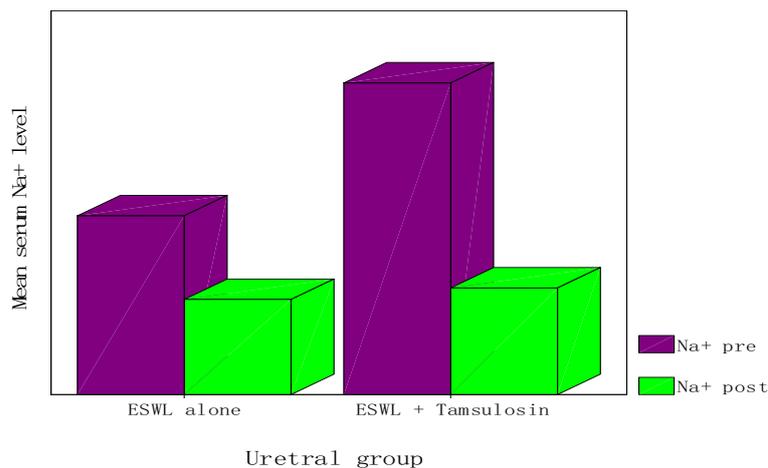


Figure (10): The effect of ESWL alone, ESWL and tamsulosin on serum sodium within urethral stone groups.

Identical superscript letters (a,a) represent no significant difference ( $p>0.05$ ), Non-identical superscript letters (a,b) represent significant difference ( $p<0.05$ ), (\*) means significant difference ( $p<0.05$ ) when compare within pre & post treatment.

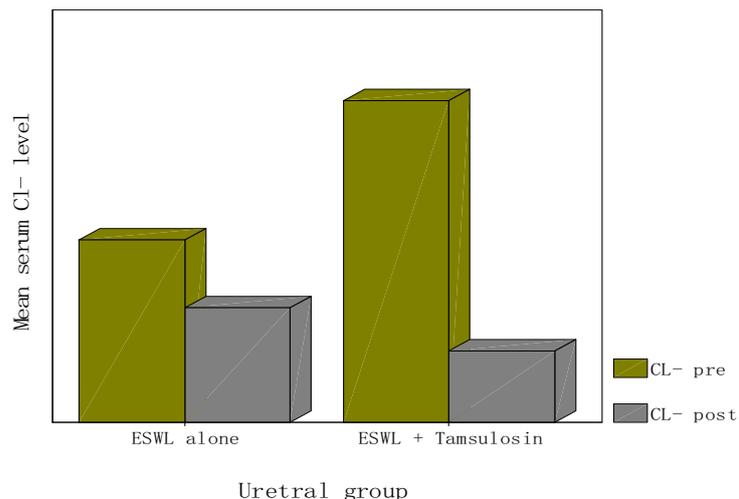


Figure (11): The effect of ESWL alone, ESWL and tamsulosin on serum chloride within urethral stone groups.

Identical superscript letters (a,a) represent no significant difference ( $p > 0.05$ ), Non-identical superscript letters (a,b) represent significant difference ( $p < 0.05$ ), (\*) means significant difference ( $p < 0.05$ ) when compare within pre & post treatment.

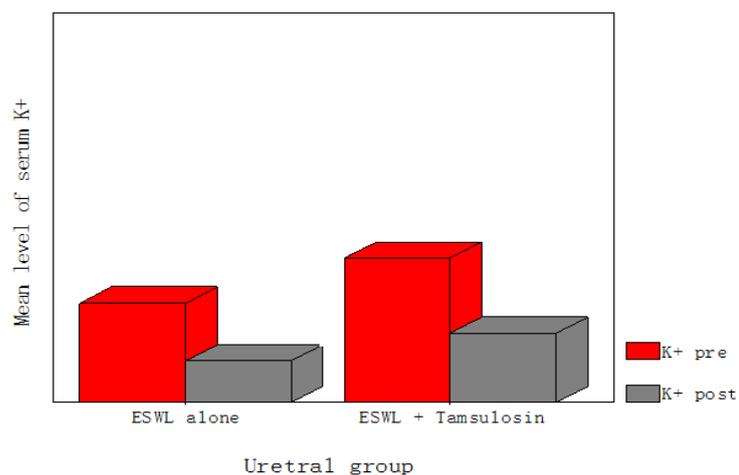


Figure (12): The effect of ESWL alone, ESWL and tamsulosin on serum potassium within urethral stone groups.

Identical superscript letters (a,a) represent no significant difference ( $p > 0.05$ ), Non-identical superscript letters (a,b) represent significant difference ( $p < 0.05$ ), (\*) means significant difference ( $p < 0.05$ ) when compare within pre & post treatment.

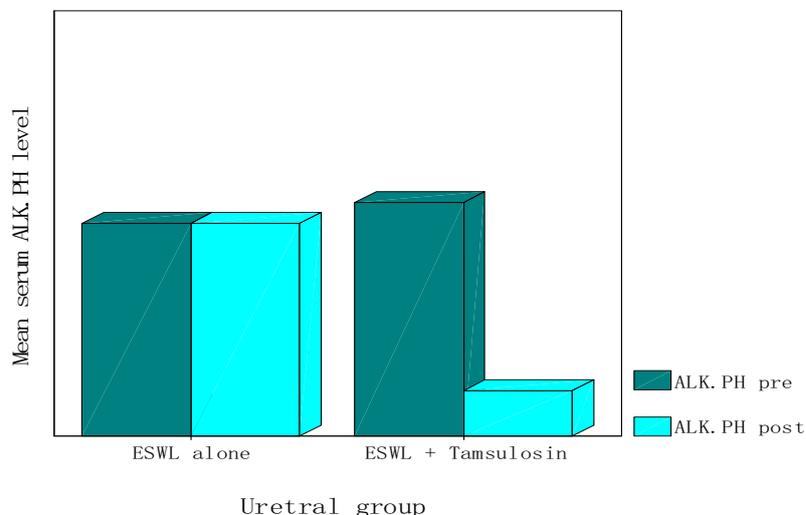


Figure (13): The effect of ESWL alone, ESWL and tamsulosin on serum ALP within urethral stone groups.

Identical superscript letters (a,a) represent no significant difference ( $p > 0.05$ ), Non-identical superscript letters (a,b) represent significant difference ( $p < 0.05$ ), (\*) means significant difference ( $p < 0.05$ ) when compare within pre & post treatment.

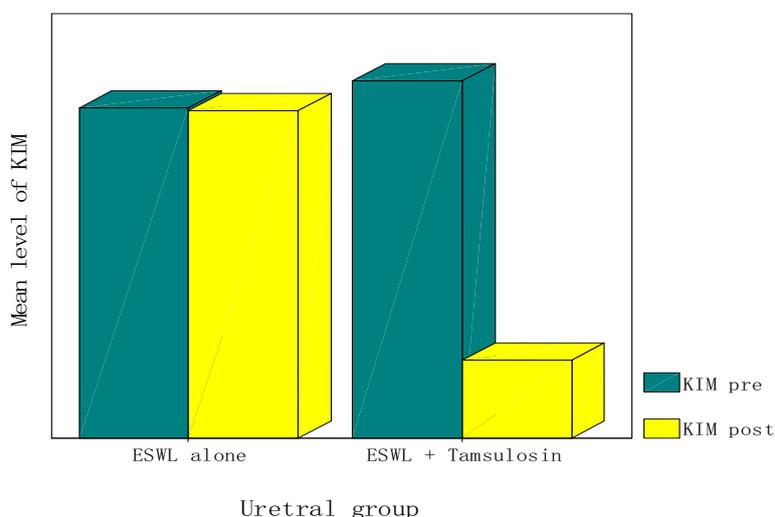


Figure (14): The effect of ESWL alone, ESWL and tamsulosin on serum KIM-1 within urethral stone groups.

Identical superscript letters (a,a) represent no significant difference ( $p > 0.05$ ), Non-identical superscript letters (a,b) represent significant difference ( $p < 0.05$ ), (\*) means significant difference ( $p < 0.05$ ) when compare within pre & post treatment.

### Discussion:

#### Demographic and Baseline Characteristics:

The incidence of nephrolithiasis is highest in males<sup>(10)</sup>, where the incidence of kidney stones rises after age 20, peaks between 40 and 60 year of age (at approximately 3 per 1000 per year), and then declines<sup>[156, 111]</sup>. In females, the incidence rate is higher in the late 20s, decreases by age 50, and remains relatively constant thereafter<sup>(11)</sup>.

In the current clinical study, we compared within renal stone groups (group I and II), and urethral stone groups (group III and IV), in relation to the demographic and baseline characteristics to define if there is a significant difference regarding to age, gender, stone size and smoking variables.

From table (3); there were no significant differences ( $p$  value  $> 0.05$ ) within groups of the study population and it was matched in regarding to age, gender, this finding was supported by many studies which show that the peak incidence of renal stone is between 40-60 years<sup>[11-14]</sup>. Similarly, patients aged are within this range in each

of the four groups. Also there were no significant differences ( $p$  value  $> 0.05$ ) between groups of the study population and it was matched in regarding stone size and smoking variables.

#### **The effect of ESWL alone, ESWL and tamsulosin on biomarkers within renal stone groups:**

Management of urinary stones has been revolutionized by the induction of ESWL. ESWL is a superior modality of treatment; however it is not devoid of side effects as it causes severe effects and damage to renal parenchyma<sup>(15)</sup>. Current study attempts to assess the effects of ESWL alone on renal biomarkers by measuring the blood chemistry including cell escaped enzymes before and after ESWL as well as to investigate the effect of tamsulosin on these biomarkers. It is generally agreed that cell damage after ESWL correlates well with the changes in cell escaped enzymes, increase in serum enzyme activities and excretion of proteins, indicating tubular and glomerular damage of kidney.<sup>(16)</sup> To assess the effect of the ESWL alone, ESWL and tamsulosin on blood urea, serum creatinine, alkaline phosphatase, blood ions and KIM-1, one way ANOVA test, and paired sample t test were used to compare within renal stone groups (group I & group II). From table (4) and figures (1) up to (7) we can observe that, with the exception of comparable baseline values of serum potassium between group I and II, all of base line values of blood urea, serum creatinine, serum sodium, serum chloride, serum ALP and serum KIM-1 were no significant ( $p$  value  $> 0.05$ )<sup>(18,19,20)</sup>. Regarding group I and compared with their base line values, there were post ESWL decrease in all of blood urea, serum creatinine, serum sodium, serum chloride and serum potassium values, and post ESWL increase in serum ALP and serum KIM-1 values. However, the changes in all of post ESWL values were statically non significant ( $p$  value  $> 0.05$ )<sup>(21,22)</sup>.

Finally, for group II over I, the post ESWL values of blood urea, serum creatinine, serum ALP and serum KIM-1 decreased significantly ( $p$  value  $< 0.05$ ), while for serum sodium, serum chloride and serum potassium, the decrease was no significant ( $p$  value  $> 0.05$ ). In the current study, patients who underwent ESWL plus tamsulosin would show improvement compared to patients who underwent ESWL alone. This might be attributed to the pharmacological effect of tamsulosin. Also in the current study, the results demonstrate that the use of tamsulosin significantly reduced the level of all the measured parameters in comparison with the control group<sup>(23, 24, and 25)</sup>.

#### **The effect of ESWL alone, ESWL and tamsulosin on biomarkers within urethral stone groups:**

Urethral calculi occupy a considerable place in daily urological practice. Of all urinary tract stones, 22% are urethral, and 66% to 71% of these are located in the distal portion of the urethra. If the diameter of urethral calculi is less than 6 mm, spontaneous passage is generally possible (35% to 58 %). Urethral stones greater than 6 mm and less than 8 mm in diameter have a  $\leq 12\%$  chance to be spontaneously expelled.<sup>(32, 33, 34)</sup> Due to the availability and the high success of the ESWL, this option represents the first-line therapy for lower urethral calculi, but it implies a certain percentage of re-treatments. The major goal in treating patients with urethral stones is achieving a stone-free state. Stone fragment expulsion after ESWL is probably not dissimilar to spontaneous passage.<sup>(35,36)</sup> Several variables play an incountournable role in the migration of calculi: stone size, intrinsic areas of narrowing within the urethra, urethral peristalsis, and hydrostatic pressure of the column of urine proximal to the stone, edema, urinary tract infection, and spasm of the urethral sirc in which the stone is lodged.<sup>(38,39)</sup>

The sympathetic nervous system appears to modulate urethral activity as shown by the presence of adrenergic receptors in the urethra.<sup>(39)</sup> Hancock has reported the presence of  $\alpha$ - and  $\beta$ - adrenergic receptors in the human urethra.<sup>[40]</sup> Several studies have shown that the density of  $\alpha$ -1-adrenergic receptors in the urethral smooth muscle cells is greater than that of other adrenergic receptors.<sup>[41]</sup> Treatment regimens involving alpha-adrenergic medications promote urethral smooth relaxation.<sup>(40)</sup> Alpha1-adrenergic receptor antagonists have some degree of selectivity for the detrusor and distal urethra and have therefore been investigated for their capacity and their potential to promote and enhance stone passage and decrease renal pain.<sup>(41, 42)</sup>

To assess the effect of the ESWL alone, ESWL and tamsulosin on blood urea, serum creatinine, alkaline phosphatase, blood ions and KIM-1, one way ANOVA test, and paired sample t test were used to compare within urethral stone groups (group III & group IV). From table (5) and figures (8) up to (14) we can observe that, with the exception of comparable baseline values of serum sodium between group III and IV, all of base line values of blood urea, serum creatinine, serum chloride, serum potassium, serum ALP and serum KIM-1 were with no significant difference in their levels ( $p$  value  $> 0.05$ ). Regarding group III and compared with their base line values, there was significant post ESWL decrease in the levels of blood urea and serum creatinine ( $p$  value  $< 0.05$ ), and non significant ( $p$  value  $> 0.05$ ) post ESWL decrease in all of serum sodium, serum chloride and serum potassium values, also non significant ( $p$  value  $> 0.05$ ) post ESWL increase in serum ALP and serum KIM-1 values.

For group IV, there was significant decrease ( $p$  value  $< 0.05$ ) in post ESWL values for all of blood urea, serum creatinine, serum sodium, serum chloride, serum potassium, serum ALP and serum KIM-1, when they compared with their pre ESWL values. This might be attributed to the effect of tamsulosin in improving the

passage of fragments generated after ESWL. During ESWL, stones often generate larger fragments that migrate less easily. In such cases, tamsulosin could promote the passage of these fragments by increasing the intra urethral flow and the intra urethral pressure gradient above the stone, or by decreasing the peristalsis above the stone.

Finally, for group IV over III, there was post ESWL decrease in all of the measured parameters, significantly for blood urea, serum creatinine, serum ALP and serum KIM-1 ( $p$  value  $< 0.05$ ), and non significantly for serum sodium, serum chloride and serum potassium ( $p$  value  $> 0.05$ ). In the current study, the improvement was only occurring among group's patients who underwent ESWL plus tamsulosin treatment compared to ESWL alone. This might be attributed to the effect of tamsulosin in improving the passage of fragments generated after ESWL. Also in the current study, the results demonstrate that the use of tamsulosin reduce the level of all the measured parameters in comparison with the control group.

#### Conclusions:

There were significant differences in the clinical outcomes obtained after using tamsulosin for 14 days in patients with renal and urethral stones who underwent lithotripsy compared with those patients who were not used tamsulosin. In the current study, regarding groups of patients who underwent ESWL alone, there was non-significant improvement ( $p$  value  $> 0.05$ ) in the levels of blood urea, serum creatinine, serum sodium, serum chloride and serum potassium. While group's patients who underwent ESWL plus tamsulosin treatment, the levels of all of the measured parameters improved significantly ( $p$  value  $< 0.05$ )

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