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Characteristics of Calculi in the Urinary Tract

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ABSTRACT

Introduction: Elimination of stone is determined by size and its localization. Stone from the ureter in 80% of cases can be eliminated spontaneously. If the stone by its characteristics is not spontaneously eliminated, taken are further steps and therapeutic protocols to solve this problem. **Material and methods:** The study was prospective, open and comparative. It was conducted at the Urology Clinic Clinical Center of Sarajevo University in the period from 2007 to 2013. The study included 404 patients with urinary tract lithiasis treated by ESWL. ESWL treatment is performed on the machine Siemens Model Lithostar Multiline, which has a combined ultrasonographic and fluoroscopic display, large energy density in order to obtain optimum focus (without damaging surrounding tissue) and minimal pain that on rare occasions requires for mild sedation-sedation. **Results:** From a total of 404 patients included in the study there were 234 (57.92%) male and 170 (42.08%) female patients. The most common type of stone both in female and male patients was calcium type. From a total of 262 calcium stones, 105 of them (40.07%) was present in female patients and 157 (59.92%) in male. Share of infectious type of stone in female patients was 63 (49.60%) and 64 among males (50.39%). Other stones were less abundant in both the gender groups and their total number was only 17. In women their frequency was 2 (13.33%) and 13 among males (86.67%). There was a significant difference in the frequency of different types of stones by gender ($\chi 2 = 11.47$, $p = 0.009$). **Conclusion:** There was no statistically significant correlation between the number of treatments and localization of stones in the ureter, as well as a statistically significant correlation between the size of the stone and the localization of calculus in the ureter.

Key words: stone in urinary tract, ESWL method of urinary stone treatment.

1. INTRODUCTION

Every year between the 1200 to 1400 persons per million develop urinary calculosis with a male to female ratio of 3:1 (1). Urology is probably the oldest branch of surgery, knowing that one of the first operations was safe and resolve stone jammed on the outer opening of the urethra (2).

Creation of stones in the urinary organs (urolithiasis) is a very common disease (3). Urinary tract stones are sixth health problem. Epidemiological data suggest an increased prevalence of upper urinary tract calculi in developed countries (4). Various authors suggest that urinary calculi constitute 1-3 per thousand total hospitalized patients which makes 15-24% of patients in the urology departments (5). This disease have several names: nephrolithiasis–meaning kidney stone, nephrolithiasis and the word is derived from the Greek word nephros (kidney) and lithos (stone). Word of urolithiasis–urinary (urine) stone is derived from the French word urine and Greek ouron meaning urine. It is also used as renal calculus from the Latin word calculus (plural–calculi), which means gravel. Urolithiasis also affects animals: the stones were found in dogs, cats, rabbits, minks, etc., and the components are the same as in humans (1). Urolithiasis occurs during the most productive human age from 30 to 50 years of age, but has been described in all age groups (6). It was found in newborns and fetuses. However, urolithiasis in children is rare. Only 2-3% of cases occur in the pediatric age (7). It is believed that 12% of men and 4% of women in developed countries suffer from urinary stones. In case of a positive family history, this number doubles (2). One of the reasons for its frequent occurrence in men is explained by the increased endogenous production of oxalate in the liver under the influence of testosterone, while in the urine of women is on average higher concentration of citrate, otherwise, increase the solubility of calcium. Calculosa with women predominantly induced urinary infections and metabolic disorders, while in men predominate idiopathic lithiasis or calcium lithiasis and uric acid (5). Percentage of recurrent calculosis is 50% within 5 years and 70% over 10 years (8). Stones less than 2 mm easily pass through the ureter. Most calculi (90%) from 4 to 5 mm are eliminated spontaneously. Percentage decreases to 50% at stones of 4 to 6 mm and 20% at stones larger than 6 mm (1,2).

2. PROBLEM FORMULATION

One of the most common pathological conditions in human medicine is the presence of a stone in the urinary tract, characterized more often as urolithiasis. In countries with developed industry this disease affects approximately 1500 to 2000 patients per million inhabitants. The disease usually affects people in the fourth and fifth decade of life who are working, and their absence from work due to healing has significant social and economic implications on the society. Stones can be localized in

different areas of the urinary system. Localization of the stone is determined by several factors, including even the demographic characteristics. In developed countries, 97% of the stones are localized in the kidney and ureter where in 59% of cases in the ureter. Urethral stone is in 75% of cases located in the iliac and pelvic part of the ureter (1, 3). Elimination of the calculi depends on size and its localization. Stones from the ureter in 80% of cases can be eliminated spontaneously. If the calculi in their characteristics are not spontaneously eliminated, taken are further steps and therapeutic protocols to solve this problem. Asperitan stone and stone larger than 7 mm in diameter, which practically cannot be spontaneously eliminated, threatening development of kidney urostasis and infection (2). Indications for an active therapeutic approach to ureter stones is stone diameter over 7 mm with low (below 20%) probability of spontaneous elimination or absence of spontaneous stone elimination of any size for a period longer than 30 days from the first renal colic, urinary infection develop, sepsis, calculous anuria, as well as the request of patients. Treatment of urolithiasis includes conservative, surgical treatment, and treatment with extracorporeal shock wave lithotripsy (ESWL) depending on the evaluation. Recently, endoscopic procedures, such as eretheroscopy (URS) and percutaneous lithotripsy (PCNL), together with the aforementioned ESWL, have been almost entirely replaced open surgery, so in just 30 years, radically changed the approach and functional outcome of this disease (1, 2).

ESWL treatment is the first-line treatment of urinary tract stones, but there are still no clearly defined limits and recommendations for its use in the treatment of urinary calculi, depending on its location, size and morphological structure. This raises the question of efficiency of ESWL depending on the characteristics of urinary calculi.

3. GOALS

Determine characteristics of the patients with calculi in the urinary system, possibilities of disintegration of stones and its spontaneous elimination dependent on morphological structure of stones, their size and location in the urinary tract.

4. MATERIAL AND METHODS

The study was prospective, open and comparative. It was conducted at the Urology Clinic Clinical Center of Sarajevo University in the period from 2007 to 2013. The study included 404 patients with urinary tract lithiasis. All patients prior to initiation of therapy–ESWL treatments were subjected to the following diagnostic procedures: anamnesis, clinical examination of patients, laboratory tests, ultrasound examination of the urinary tract and urinary tract X-ray, from which was derived chemical qualitative analysis of morphological stone composition. Diagnostics are used in the detection of complications such as obstruction with dilatation of the renal colorectal system, reduction of the renal parenchyma and in monitoring of renal obstruction during treatment. This type of diagnosis is not suitable for stones in the ureter and can make the difference between calcified and radiolucent concrement. ESWL treatment is performed on the machine Siemens Model Lithostar Multiline, which has a combined ultrasonographic and fluoroscopic display, large energy density in order to obtain optimum focus (without damaging surrounding tissue) and minimal pain that on rare occasions requires for mild sedation-sedation. For nominal and ordinal variables chi-square test was used. In cases when the frequency was lower than expected was used the Fisher's exact test. The degree of correlation was determined by means of the Spearman. P value of <0.05 was considered statistically significant. Statistical analysis was performed using SPSS computer software for statistical analysis (SPSS Statistical Package for the Social Sciences) version 13.0.

5. RESULTS

From a total of 404 patients included in the study there were 234 (57.92%) male and 170 (42.08%) female patients. The most common age group in the sample was at age from 35 to 45 years and consisted of 110 respondents (27.09%). The minimum number of respondents had the age over 65 years 19 respondents (4.67%).

The most common type of stone both in female and male patients was calcium type. From a total of 262 calcium stones, 105 of them (40.07%) was present in female patients and 157 (59.92%) in male. Share of infectious type of stone in female patients was 63 (49.60%) and 64 among males (50.39%). Other stones were less abundant in both the gender groups and their total number was only 17. In women their frequency was 2 (13.33%) and 13 among males (86.67%). There was a significant difference in the frequency of different types of stones by gender ($\chi 2 = 11.47$, $p = 0.009$).

Due to the very low prevalence of other types of stones and inability to perform the chi-square test to a group of other stones are grouped stones which, by virtue were cystine, xanthine stones and uric acid stones. The incidence of cystine calculi was 4 (0.9%), frequency of xanthine stones 3 (0.7%) and uric acid 8 (1.9%). In the group of female respondents 74 (40.88%) had calculus size up to 10 mm, while in the group of male patients stone size up to 10 mm had 107 (59.12%). In the group of female respondents 96 of them (43.05%) had a size of stone exceeding 10 mm, while in the group of male patients stone size over 10 mm had 127 (56.95%). There was no statistically significant difference in the incidence of stones with sizes up to 10 and over 10 mm by gender ($\chi 2 = 0.192$, $p = 0.661$)

Number of stones localized in the upper pole of the kidney in women was 43 (48.86%), and among men was slightly lower and amounted to 45 (51.13%). Number localized in the lower pole of the kidney in women was 22 (61.11%), and among men was slightly lower and amounted to 14 (38.88%). Number of stones localized medially among women was 38 (45.78%), and among men was slightly lower and amounted to 45 (54.21%). Number of localized in the renal pyelon in females was 27 (40.39%), and among men was slightly lower and amounted to 40 (59.70%). There was no statistically significant difference in the frequency of localization of stones by gender.

The incidence of urolithiasis at the site of physiological narrowing of the ureter in female subjects was 22 (27.5%) and 58 in males (72.5%). The incidence of urolithiasis at the site of the physiological enlargement of the ureter in female subjects was 8 (50%), and the same among men 8 (50%). There was no statistically significant difference in the frequency of localization of calculi to physiological narrowing and widening of the ureter in relation to gender differences ($p = 0.086$).

The most common size of the calculi in the sample was 15 mm. This size had 21.04% of respondents. The second most common size of the calculi in the sample was 9 mm, which had

14.6% of respondents, followed by the size of 20 mm, which had 14.38% of the respondents. The least frequent size calculi were 17 mm, which was only 0.25% of the respondents.

Size of the calculi in women was 12 (8-15 mm), while in men it was 12 (8-15 mm). There was no statistically significant difference in the size of calculi between males and females (p = 0.557).

There was a significant mild positive correlation between age and size of the stone in the total sample (rho = 0.240, p <0.01), i.e. Increase with age slightly increases the size calculi.

In the group of patients who had a negative family history of calculus size to 10 mm were present in 108 (59.67%), while in the group of subjects who had a family history size of stones up to 10 mm had 73 (40.33%). In the group of patients who had a negative family history of calculus size over 10 mm was registered in 160 (71.75%), while in the group of subjects who had a positive family history of calculus size over 10 mm was registered in 63 (28.25%). There was a statistically significant correlation between the size of stones and positive / negative family history ($\chi 2 = 6.529$, p = 0.011), respectively, in patients with a positive family history more often were present small stones (to 10 mm). Size of the calculi in patients who had a positive family history was 12 (9-15 mm), while the size of stones in patients who had a positive family history was 10 (8-15 cm). There was no statistically significant difference in the size of the stones between the groups of patients (p = 0.013).

Size of calculus in patients without recurrent urolithiasis was 11 (9-15 mm), while the size of the calculus in patients who have had recurrent urolithiasis was 12 (8-15 mm). There was no statistically significant difference in the size of calculi between groups of patients (p = NS).

Frequency of localization in the upper pole of kidney which have the size of 10 mm was 30 (34.09%), while the frequency of localization in the top half of kidney s which had more than 10 mm in size was 58 (65.91%) (Table 1).

Frequency of localization in the lower pole of the calculi that had the size of 10 mm was in 3 cases (8.33%), while the frequency of localization in the lower pole of the calculi that had the size over 10 mm was present in 33 cases (91.67%) . There was a significant dependence between the size of the stone and the same localization in renal pole (Fisher's exact test, p = 0.003).

			Kidney pole		Total
			Upper	Lower	
Size	Up to 10 mm	N	30	3	33
		% within size	90.90909	9.090909	100
		% within pole	34.09091	8.333333	26.6129
		% Total	24.19355	2.419355	26.6129
	Over10 mm	N	58	33	91
		% within size	63.73626	36.26374	100
		% within pole	65.90909	91.66667	73.3871
		% Total	46.77419	26.6129	73.3871
Total		N	88	36	124
		% within size	70.96774	29.03226	100
		% within pole	100	100	100
		% Total	70.96774	29.03226	100

Table 1. The dependence of the calculus size and localization in relation to poles. Fisher exact test; p=0.003

Looking at the frequency of stones it is a lot bigger on the top half, but looking at their size, larger stones (over 10 mm) were significantly more often present in the lower half.

Size of calculi localized medially was 14 (10-15 mm), while the localization pyelon was 15 (12-18 mm). There was a significant difference in size between the mentioned calculus localization (p = 0.022). Stones that occur in the renal pyelon are higher than the stones that are found in our study, in medial position.

Frequency medial localization of calculi which size was less than 10 mm was 33 (39.75%), and frequency of 50 (60.25%) for stones ranging in size over 10 mm. Pyelon localization of calculi which size was less than 10 mm was 5 (7.46%), and frequency of 62 (92.53%) for stones ranging in size over 10 mm. There was a significant correlation between the size of the stone and localization of stones (medial / pyelon) ($\chi 2 = 20.443$, p <0.001).

Frequency of calculi localization at sites of physiological stricture site that had the size of 10 mm was 68 (85%), while the frequency of localization at sites of calculi physiological stricture site which had the size over 10 mm was 12 (15%). Frequency of localization at sites of calculi enlargement physiological ureter which had the size of 10 mm was 15 (93.75%), while the frequency of localization at sites of calculi enlargement physiological ureter which had the size over 10 mm, was 1 (6.25%) . There was no statistically significant dependence between the size of tartar and calculus localization to physiological constriction and expansion of the ureter (p = 0.688) (Table 2).

In the group of patients under 35 years the incidence of calcium stones was 88 (33.58%), while in the age group of 35-55 years the incidence of calcium type of calculi was 135 (51.52%). The frequency of this type of calculi in subjects older than 55 years was 39 (14.88%). In the group of patients under 35 years the incidence of infectious stones was 26 (20.47%), and at the age of 35 to 55 years the incidence of infectious types of calculi was 63 (49.60%). The frequency of this type of calculi in subjects older than 55 years was 38 (29.92%). In the group of patients under 35 years the incidence of other types of stones was 4 (26.66%), while in the age group of 35-55 years the incidence of other types of calculi was 7 (46.66%). The incidence of other

			According to E		Total
			1	2	
Size	Up to 10 mm	N	68	15	83
		% size	81.92771	18.07229	100
		% according to E	85	93.75	86.45833
		% Total	70.83333	15.625	86.45833
	Over 10 mm	N	12	1	13
		% size	92.30769	7.692308	100
		% according to E	15	6.25	13.54167
		% Total	12.5	1.041667	13.54167
Total		N	80	16	96
		% size	83.33333	16.66667	100
		% according to E	100	100	100
		% Total	83.33333	16.66667	100

Table 2. Dependence between the size of the stone and its localization in the ureter. Fisher exact test; p=0.688. E1- physiological narrowing of the ureter, E2 physiological enlargement of the ureter

			Type			Total
			calcium	infectious	other	
Age groups	Up to 35 years	N	88	26	4	118
		% age groups	74.57627	22.03389831	3.389831	100
		% type	33.58779	20.47244094	26.66667	29.20792
		% Total	21.78218	6.435643564	0.990099	29.20792
	35-55 years	N	135	63	7	205
		% age groups	65.85366	30.73170732	3.414634	100
		% type	51.52672	49.60629921	46.66667	50.74257
		% Total	33.41584	15.59405941	1.732673	50.74257
	Over 55 years	N	39	38	4	81
		% age groups	48.14815	46.91358025	4.938272	100
		% type	14.8855	29.92125984	26.66667	20.0495
		% Total	9.653465	9.405940594	0.990099	20.0495
Total		N	262	127	15	404
		% age groups	64.85149	31.43564356	3.712871	100
		% type	100	100	100	100
		% Total	64.85149	31.43564356	3.712871	100

Table 3. Dependence of age and types calculus. χ2=15.170 df=4; p=0.004

types of calculi in subjects older than 55 years was 4 (26.66%). Statistically significant dependence between age and type of calculi ($\chi 2 = 15.170$, $p = 0.004$) (Table 3).

6. DISCUSSION

Renal lithiasis is a disease in which the stones were formed in the collecting tubules, cups and pyelon. The incidence was similar in both kidneys, and about 40% of patients had bilateral stones. There is a wide range of risk factors that may be associated with the disease, including local and general factors. Of local risk factors that favor the emergence of this disease are: trail of urine, disorders of innervation, anomalies of drainage pathways, anatomical abnormalities (sponge kidney, horseshoe kidney), and recurrent infection. General risk factors are categorized as: metabolic (calciuria, cystinuria), hormonal (primary hyperparathyroidism, hyperthereodosis and hypovitaminosis) and other factors such as climatic conditions of life, feeding, pH of urine excretion of concentrated urine, prolonged immobilization, etc. (1, 9, 10).

Formation of kidney stones attempted to explain many theories but none fully explains the mechanism of occurrence. Urine is in the usual conditions supersaturated solution in which the particles are held in solution influence crystallization inhibitor and colloids. If these factors are disrupted leads to precipitation and aggregation of crystals. The organic matrix, which consists of cellular detritus, blood and bacteria may be the main factor that leads to nucleation and crystal growth. One theory in the spotlight puts deficit of crystallization inhibitors. There is a theory which states that the formation of stones occurs when the crystals, which are constantly being created in the urine oversaturated with salts, are not washed away in the urine. This may occur due to damage to the epithelial duct to which it adheres crystal (11).

Changes in the socio-economic conditions have influenced the changes in the frequency and type of urolithiasis in terms of localization and physico-chemical properties of stones. Major variations on the occurrence of urolithiasis in the world are presented to the public in terms of geographical areas. Annual incidence in England is 22 cases per 100,000 inhabitants, in Kuwait 23.9 per 100,000 population. However, in some countries there are significant differences in the incidence, such as Sweden, where the incidence of 140 per 100,000 inhabitants, Italy 168 per 100,000 inhabitants and United States with high prevalence of 277 per 100,000 population. In Europe, urinary stones are found mainly in the upper urinary tract, while the proportion of stones in the bladder does not exceed 10.0%. It is shown that the urinary bladder calculi more common in the elderly (12).

The disease is more common in men and usually occurs after the third decade of life. It is shown that Caucasians are more likely to develop kidney stones than African Americans, and men more often than women patients. A possible explanation why men are more frequent in patients than in females lies in the fact that men in performing physical activities much sweat and lose a lot of fluid, which is also the main reason for the formation of a kidney stone or a stone in the bladder (1).

Some new studies are mostly directed of change in the relationship of occurrence calculi in men and women. In the United States–and the data showed that the overall incidence of urolithiasis 10.6% for men and 7.1% for women. This is explained by balancing risks for both men and women today, compared to the past when they were significantly different (13).

Results of this study showed that the total number of subjects included higher percentage occupied by male respondents and 57.92%, while the remaining 42.08% are occupied by the respondents are female. The results are consistent with published data showing a higher incidence of this disease in male patients compared to female respondents.

Greater tendency of men to concentrate urine compared to the opposite sex, may be the reason for higher incidence of this disease in men. It is shown that the higher the osmolality in men also work super saturation which is responsible for the crystallization of poorly soluble compounds. Even if the concentration of poorly soluble compounds reaches the threshold of saturation of the total 24-h urine, then it can exceed during transient episodes, the way to increase the intake of foods rich in protein, at night, or during intense exercise, especially in the summer months, or season in which men showed a significant decrease in urine volume. Although urolithiasis 2-3 times more common in men, there are no studies that clearly define the reasons for variations incidence of this disease (1,3).

Daudon and colleagues (14) show that men older than 80 years constitute 40.0% of the analyzed patients with urinary bladder calculi. Prostatic hyperplasia is more common in the elderly and causes an obstruction in the urinary tract. This may be a possible explanation for the high incidence of stones in the bladder in the elderly. Women are also at risk calculus appears in the lower parts of the urinary tract. This suggests the existence of other risk factors, such as changes in bladder function associated with relaxation of smooth muscle tone in the elderly, with an efficiency reduction bladder emptying favoring stagnation of urine and the occurrence of tartar.

When it comes to the size calculi, the results of our study showed a statistically significant positive correlation between age and size of the stone in the total sample ($rho = 0.240$, $p < 0.01$). Classifying respondents into three age groups, our results showed that the highest incidence of stones measuring greater

than 10 mm was represented at the age between 35 and 55 years. Chi-square test showed a statistically significant correlation between age and size of the stone ($\chi 2 = 40.287$, $p < 0.00005$).

The study by Alaya and associates (12), who analyzed the sample of 1301 urinary tract stones, it has been proven that the highest percentage share of 58.6% occupied stones of calcium type, that type of calcium oxalate, but they also recorded an increase in the incidence and types of stones uric acid. The authors believe that in the last 50 years there has been a change in eating habits associated with an increase in foods rich in purines (animal proteins projections and seafood), which correlates the increase in uric acid in the urine, and increasing incidence of this type of calculi. Their results show a clear increase in uric acid stones in both sexes.

The results of our study showed that the group of patients under 35 years the incidence of calcium stones was 33.58%, the incidence of infectious stones 20.47%, while the incidence of other types of stones was 26.66%. At the age of 35 to 55 years the incidence of a calcium type of calculi was 51.52%, the frequency of the infectious type of calculi was 49.60%, and the prevalence of other types of stones was 46.66%. The frequency of this type of calcium calculi in subjects older than 55 years was 14.88%, infectious stones were 29.92%, while the incidence of other types of calculi in subjects older than 55 years was 26.66%. There was a statistically significant correlation between age and type of calculi ($\chi 2 = 15.170$, $p = 0.004$), i.e. among younger patients are the most common types of calcium stones, while the incidence of infectious types of stones rarer. Increasing age leads to equalization of the frequency of calcium and infectious stones.

Differences in the incidence of age and stones were analyzed through a large number of epidemiological studies. There are certain variations according to geographical areas. In 1993, Baker et al (15) reported that in Australia peak incidence of urolithiasis calcium oxalate sampled observed in individuals between 50 and 60 years of age. In Europe, research shows that the stones which are chemically calcium oxalate more common in people between 40 and 50 years of age. In Asia, the highest prevalence of calcium oxalate stone formation occurs at an earlier age range 30 to 50 years (1).

Certain hereditary disorders that run in the family increases the risk of recurrent kidney stones. A rare hereditary disease, renal tubular acidosis, increases the acidity of urine, which is favorable for the occurrence of kidney stones. Cystinuria is a hereditary disorder of the metabolism of amino acids, which results in high levels of cystine in the urine and blood, leading to frequent formation of cystine kidney stones. Second, a hereditary disorder of metabolism, hyperoxaluria, is resulting in high levels of oxalate salt in the body, which is combined with calcium in the form of kidney stones. Hypercalciuria causes high accumulation of calcium in the body, which increases the incidence of kidney stones. Hiperuricosuria increased level of uric acid in the urine, which leads to the formation of uric acid stones (1,3).

Diet, in terms of animal protein (52 g / day), sodium (50 mg / day) and the oxalate (200 mg / day) with a normal intake of calcium (1,200 mg / day), reduced recurrent stones for almost 50% and more, within five years, compared to a diet low in calcium (400 mg / day) and oxalate (16).

Our results show that the proportion of respondents who did not have positive personal and family history of urolithiasis was 44.94%, and patients who had a positive family history of urolithiasis, but he had a personal history was 50.05%. The share of respondents, who had a family history, and negative personal history of urolithiasis, was 42 (30.88%), while the number of respondents who had a positive to families and personal history was 136 (33.74%). There was a significant frequency dependence of family and personal history ($\chi 2 = 7.41$, $p = 0.006$), i.e. Higher incidence of recurrence in patients who have a positive family history of urolithiasis.

Similar results were presented by the study Koyuncu and associates (17,1), which showed a significant correlation recurring calculi and positive family history. The authors also found that the time interval between the onset of recurrence was significantly shorter in patients who had a positive family history of urolithiasis. By analyzing the patients according to sex, the authors noted that the incidence of recurrence was more frequent in males than females respondents. The authors believe that the information positivity family history is very important and can provide valuable information about the possibility of future attacks as well as the severity of the disease.

Epidemiological and randomized studies have shown greater security ESWL treatment methods in breaking stones when it starts with applying lower energy sequences of the same, with a gradual increase energy sequences, resulting in a vasoconstriction which prevents renal damage and the difference in the fragmentation is not significant despite the fact that whether amplification is carried out or not (1).

Previous clinical and epidemiological studies have shown that as an indication of ESWL treatment of urolythiasis depends on several factors, including the size, localization, consistency and other histological characteristics of calculi (1,2). Pregnancy and specific internship and urological diseases, with an emphasis on acute urinary infection, contraindications to perform of ESWL (4).

7. CONCLUSION

From a total of 404 patients included in the study there was 57.92% male and 42.8% female respondents, or male : female ration of 1.2 : 1, while the most common age group in a sample of patients with urolithiasis was between 35 and 45 years(27%). The mean size of the stones in men and in women was 12 mm.

Most frequent type of calculi both in female and male subjects was of calcium type. In younger patients the most common are calcium stones, with increase in respondents age calcium and infectious stones frequencies were equalized.

There was a significant correlation between the size of the stone and its localization in renal pole. The incidence of stones was significantly greater in the top half, but the size of large stones (over 10 mm) were significantly more present in the lower kidney pole.

There was no statistically significant relationship between the size of stones and personal history, but statistically significant correlation is determined between the size of the stone and family history of urolithiasis.

Also there was significant correlation between the size of the stone and its localization (medial / pyelon). Stones up to 10 mm are more frequently localized medially, and those larger than 10 mm are somewhat more common in the pyelon.

CONFLICT OF INTEREST: NONE DECLARED

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