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Urolithiasis in Iraqi Patient

A Clinical Analytical Study

Submitted To Al-Nahrain University - College Of Medicine

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وَإِذَا مَرِضْتُ فَهُوَ يَشْفِينِ

DEDICATION

DEDICATED TO…

MY PARENTS,

SISTER,

AND BROTHER.

&

A Special dedicate to my best Friend who always stand behind me

Mohammed Adnan

For Supporting and Encouragements during my study and In All My Life Aspects.

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Finally, I wish to express my deep appreciations to my friends and collegeous who always stand behind me and enhance my self-confidence.

LIST OF ABBREVIATIONS

ESWI	Extracorporeal Shock Wave Lithotripsy
URS	Ureterorenoscopic lithotripsy
DJ	Double J catheter/stent
DM	Diabetic Meletus

SUMMARY

BACKGROUND:

Urinary stone disease, also known as urolithiasis, is one of the leading afflictions worldwide. The incidence differs with geographic distribution Today large number of population suffers from kidney stone, gall stone and urinary calculi and increases steadily during the recent 20 years, due to high calories intake from dietary and lack of exercise in lifestyle Non-contrast computerized tomography of the urinary tract is the modality of choice in the diagnosis of uric acid calculi, and has the ability to detect calculi with a low attenuation coefficient value. Treatment approach is effective in most of the cases except in certain situations where there is rising blood chemistry, advanced uremia, sepsis, or constant pain URS stone removal has become the procedure of choice for most patient with ureteral stones

AIM:

To study urolithiasis in Iraqi patient a clinical analytic study.

TYPE OF STUDY (DESIGN):

Cohort observational stud

PATIENT AND METHOD:

82 patients were enrolled in the study who admitted to surgical ward in AL-Emamain AL-Khadhumain Medical city. A retrograde study were done and the data were collected according to (age, gender, date of admission, chief complaint, history of hypertension, history of DM, type of anaesthesia, DJ insertion) From the period of June, July, November and December - 2018.

The collected data were analysed and then presented using Microsoft Excel software.

Results:

- Total number included in this study was 82 patients. 75.6% of them were males and 24.4% were females.
- The age of patients in this study ranged from16to70 years, and the age group of 31-35 years had the highest number of cases, with a percentage of 17%.
- The number of cases in summer (54.9%) was greater than the winter.
- The commonest clinical features were flank pain (65%), dysuria (10.7%), nausea, vomiting (10.7%), and haematuria (13.6%).
- We found 80.5% among the cases for patients don't have hypertensive.
- Also, we found 91.5% of the cases for patients don't have Diabetic.
- According to type of Anesthesia, 91.5% of cases were General Anesthesia
- Finally, we found 81.7 % of the patient need D-J insertion.

Conclusions

- This study shows that Urolithiasis is more frequent among male patients, which commonly presented with flank pain, most of them was needed operation and use of D-J stent under general anaesthesia.

Recommendations:

- Adapt more restricted criteria in DJ use.
- Encouraging patients to follow a different lifestyle and adhering to healthy dietary diets that limit the recurrent of the kidney stones or limit its appearance.
- Enhancement for medical records.

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CHAPTER 1: INTRODUCTION

1.1 Overview

A kidney stone is a hard mass developed from crystals that separate from the urine within the urinary tract. Normally, urine contains chemicals that prevent or inhibit the crystals from urinary tract. These crystals remain tiny enough; they will travel through the urinary tract and pass out of the body in the urine without being noticed. A less common type of stone is caused by infection in the urinary tract. This stone is called struvite or infection stone. Another type of stone, uric acid stones, are a bit less common, and cysteine stones rare [1]. Kidney stones are composed of inorganic and organic crystals amalgamated with proteins. Crystallisation and subsequent lithogenesis can happen with many solutes in the urine. Calcareous stones are still by far the most common nephritis.

Urinary calculi is composed of hard mineral masses lodged anywhere in the urinary tract. The urinary tract consists of organs which filter blood to eradicate liquid waste (urine) that is excreted from the body i.e. kidneys, ureter, bladder and urethra. The stones firstly form in the kidney and then it travel to other parts of the urinary tract where they may become trapped in smaller tubes e.g. bladder stones, ureteric stones and kidney stones. The condition may be extremely painful [2].

Initially, stone formation does not cause any symptom. Later, signs and symptoms of the stone disease consist of renal colic (intense cramping pain), flank pain (pain in the back side), haematuria (bloody urine), obstructive uropathy (urinary tract disease), urinary tract infections, blockage of urine flow, and hydronephrosis (dilation of the kidney). These conditions may result in nausea and vomiting with associated suffering from the stone event [3]. Thus, the treatment and time lost from work involves substantial cost imposing an impact on the quality of life and nation's economy.

1.2 Epidemiology of Kidney Stones

Globally, kidney stone disease prevalence and recurrence rates are increasing [4], with limited options of effective drugs. Urolithiasis affects about 12% of the world population at some stage in their lifetime [5]. It affects all ages, sexes, and races [6, 7] but occurs more frequently in men than in women within the age of 20–49 years [8]. If patients do not apply metaphylaxis, the relapsing rate of secondary stone formations is estimated to be 10–23% per year, 50% in 5–10 years, and 75% in 20 years of the patient [6]. However, lifetime recurrence rate is higher in males, although the incidence of nephrolithiasis is growing among females [9]. Therefore, prophylactic management is of great importance to manage urolithiasis.

Recent studies have reported that the prevalence of urolithiasis has been increasing in the past decades in both developed and developing countries. This growing trend is believed to be associated with changes in lifestyle modifications such as lack of physical activity and dietary habits [10–11] and global warming [7]. In the United States, kidney stone affects 1 in 11 people [12], and it is estimated that 600,000 Americans suffer from urinary

stones every year. In Indian population, about 12% of them are expected to have urinary stones and out of which 50% may end up with loss of kidney functions [13].

1.3 Etiology of Kidney Stones

Formation of kidney stones (calculogenesis) is a complex and multifactorial process including intrinsic (such as age, sex, and heredity) and extrinsic factors such as geography, climate, dietary, mineral composition, and water intake [6]. A summary of possible causes of kidney stone formation is shown in Table 1.

Table 1. Risk factors associated with kidney stone formations [14,15,16,17,18,19].

Number	Risk Factor
1	*Lifestyle habits and dietary/nutritional factors*: such as excessive intake of animal proteins and salt and deficiencies of chelating agents like citrate, fiber, and alkali foods
2	*Metabolic disorders*: such as hypercalciuria, hypocitraturia, hyperoxaluria, hyperuricosuria, and history of gout (defective metabolism of uric acid)
3	*Hypercalcemic disorders*: primary hyperparathyroidism and other disturbances of calcium metabolism
4	*Urine composition*: excessive excretion of promoters of urinary crystallization and reduced excretion of inhibitors (urine deficient in inhibitory substances)

5	*Low urine volume*: inadequate water intake (dehydration and supersaturated urine)
6	*Recurrent urinary tract infections*: abnormalities of urinary pH and alkalinization of urine by bacterial urease (such as *Proteus mirabilis*)
7	*Genetic predisposition/inherited disorders*: family history of stones (*genetic*susceptibility); genetic monogenic diseases (single abnormal gene disorders on the autosomes); renal tubular acidosis
8	*Anatomical abnormalities*: factors such as defects in medullary sponge kidney, ureteropelvic junction stenosis, pyeloureteral duplication, polycystic renal disease, and horseshoe kidney
9	*Hypertension*
10	*Obesity*
11	*Climate change* (global warming), occupation, geographic conditions, and seasonal variations (higher in summer than winter)
12	*Inflammatory bowel disease* and other intestinal malabsorption or associated disease states
13	Absence of intestinal *oxalate-degrading bacteria*

14	*Lithogenic drugs*: such as indinavir (Crixivan), a protease inhibitor, sulfonamides (sulfadiazine), uricosuric agents, which have low solubility andpromotes the formation of calculi, and ceftriaxone (high dose on long terms)

Watchful waiting approach for treating urethral calculi and can be used successfully for a considerable number of patients (20-21). About 70% of ureteric stones are found in the lower third of the ureter at the time of presentation .Stones located in the distal portion of the ureter will have a successful spontaneous stone passage in about 50% of cases (20). The stone expulsion time depends on many factors consisting of stone size, location, and associated obstruction (22-24). Nevertheless, a watchful approach can result in a number of complications such as urinary tract infections, hydronephrosis, and colic events (25).Numerous case series have described rates of spontaneous passage based on stone size and location. We have found that 95% of ureteral stones 2 to 4 mm in size will pass spontaneously. This drops to 50% for stones greater than 5 mm.2Stones greater than 6 mm have a lower rate of spontaneous passage.3Duration of stone passage may be as long as 40 days.2

Alpha-adrenoreceptor antagonists (alpha-blockers), calcium channel blockers, and phosphodiesterase-5 (PDE5) inhibitors are believed to act by relaxing the ureteral smooth muscle to reduce ureteral contractions, inhibiting peristalsis and aiding in the elimination of stones (26-27). This medical management also reduces the frequency of colic pain. The stimulation of the alpha1 adrenergic receptors in the ureter increases the force of ureteric contraction and the frequency of ureteric peristalsis. Blockade of alpha1 receptors inhibits

basal tone, reduces peristaltic amplitude and frequency, and decreases intraluminal pressure while increasing the rate of fluid transport and the chances of stone expulsion. (28)..

While alpha-adrenergic blockers have been implicated as most effective therapies for the expulsion of urinary stones, other classes of drugs including thiazide and non-thiazide diuretics and alluporinol have shown to prevent the recurrence of nephrolithiasis (29). And widely used this group of drugs in preventing calcium stones (30-31)(32).

Urological treatment of urinary calculi has changed much in the past 20 yr. Various endourological treatment modalities are available for urinary calculi; ureteroscopic lithotripsy, shock wave lithotripsy (SWL), laparoscopic lithotomy, and percutaneous nephrolithotomy. Despite the liberal use of SWL, ureteroscopic lithotripsy is still the preferred treatment modality for managing ureter stones (33-34).

URS stone removal is highly effective, with a low risk of complication, and it can be performed successfully and safety by most urologists. URS stone removal has become the procedure of choice for most patients with ureteral stone (33).

The advent of small caliber ureteroscopes and advances in intraureteral lithotripsy have allowed high rates of successful and safe endoscopic treatment of ureteral calculi (34-35). Currently available semirigid ureteroscopes with a diameter of less than 7Fr and the flexible uretreroscopes can usually be passed up the ureter without ureteral dilation, thus, minimizing morbidity.

Advances in intraureteral lithotripters such as holmium: YAG laser or Freddy can yield better results. Compared with laser lithotripters, pneumatic lithotripter is old-fashioned and

has some limitations of upward migration of stone fragments and the lack of fragmentation into small particles. Of course, it is well known that pneumatic lithotripter has some proven merits of safety and cost-effectiveness. We respectively reviewed our experience of ureteroscopic lithotripsy using Swiss Lithoclast.

1.4 Extracorporeal shock wave

Advantage if ESWL low costs, high efficiency of stone disintegration, less exposure of patients to anesthesia, shorter hospitalization and fewer complications (36).

ESWL fragment the stones into smaller pieces which can then be easily passed through the ureters (37). Also, for having a maximum efficacy on the outcome of the ESWL, several technical factors need to be taken into account, such as the energy level, type, size and location of the stone, presence of UTI, frequency of the pulses, endourologic skills and previous experience with ESWL .

According to AUA Ureteral Stone Clinical Guidelines (38), ESWL is considered as the first line treatment modality for calculi less than 1 cm. The success rate of ESWL decreases when stone is located in the lower pole (39).

Other factors related to renal anatomy such as hydronephrosis, stenosis of the ureteropelvic junction, horseshoe kidney and patient-related factors such as obesity, skin to stone distance and chronic renal disease, can also influence the result of ESWL (29-31).

Recent evidence has suggested the utility of ESWL for proximal ureteral stones which can be expanded to stones up to 15mm (33). Shafi et al. reported the success rate of 78.6%

after 3 months of follow-up and also most of patients prefer ESWL over other procedures (32). Contraindications for ESWL treatment include pregnancy, uncontrolled urinary tract infections and obstruction, decompensated coagulopathy, arrhythmia, uncontrolled hypertension and renal artery or abdominal aortic aneurysm (38, 45). Almost in all cases, microscopic hematuria may occur but only about one third of patients will develop gross hematuria which are self-limiting in most cases and can be managed conservatively (45).

1.5 Percutaneous nephrolithotomy (PCNL)

Over the past two decades minimally invasive procedures have become widely accepted and have almost entirely replaced open surgery. Percutaneous nephrolithotomy (PCNL) has rapidly become a standard of care for the treatment of all stones greater than or equal to 2 cm (46). In 1976, Fernstrom and Johansson (47) were first to established PCNL as an accepted surgical procedure for extracting urinary calculi, whole or in fragments, under radiological control. However, of note, the risk of complications is higher than other endoscopic procedures, particularly if a surgeon is less experienced. The stone burden or composition will not affect the efficacy of PCNL which is the main advantage of this procedure . Pearle et al. reported that the stone free rate for stones smaller than 10 mm is 100 % of patients treated with PCNL, while only 63% for those treated with ESWL (46). Percutaneous removal of stones is currently indicated for patients with staghorn calculi, kidney stones greater than 2 cm, and lower pole stones greater than 1.0 cm (47). Contraindications to PCNL include uncorrected coagulopathy, urinary tract infections, inability to tolerate prone position especially in the case of respiratory compromise, and pregnancy. It is imperative to adequately treat any urinary tract infection prior to the

procedure (48). Obtaining a proper access into the collecting systems is critical for safe and effective treatment. The procedure is performed using a posterior calyx usually in the upper or lower pole depending on the stone location and proximity of adjacent organs. Once the access to the collecting system is obtained, the tract to the renal pelvis is dilated using radiological assistance. Following these procedures, energy sources are used to break the stone in case intact removal of the stone is not feasible (49).

6. Open Surgery

There is decrease in the use of higher aggressive treatment approaches. Open surgery is needed in 1-5.4% of cases, according to the expertise worldwide (50-52). The current indications for open surgery according to European Association of Urology (EAU) (53) are as follows: complex stone burden, unsuccessful minimally invasive procedures such as ESWL or PCNL, comorbid medical diseases, morbid obesity, anatomical abnormalities (such as infundibular stenosis, PUJ obstruction, and stricture), skeletal deformity and nonfunctional kidney (nephrectomy) (52-54).

CHAPTER 2: THE STUDY

2.1 AIM OF THE STUDY:

To study urolithiasis in Iraqi patient a clinical analytic study.

2.2 TYPE OF STUDY (DESIGN):

Cohort observational study

2.3 PATIENT AND METHOD:

82 patients were enrolled in the study who admitted to surgical ward in AL-Emamain AL-Khadhumain Medical city. A retrograde study were done and the data were collected according to (age, gender, date of admission, chief complaint, history of hypertension, history of DM, type of anaesthesia, DJ insertion) From the period of June, July, November and December - 2018.

The collected data were analysed and then presented using Microsoft Excel software.

2.4 RESULTS:

2.4.1 Percentage of Age Distribution

Table 2.1. Age Distribution

The Age (yr)	No. Of Frequency	Percentage Of Cases
16 -20	7	8.5%
21-25	12	14.6%
26-30	8	9.8%
31-35	14	17.1%
36-40	8	9.8%
41-45	7	8.5%
46-50	13	15.9%
51 -55	5	6.1%
56 -60	6	7.3%
61-65	1	1.2%
66-70	1	1.2%
Total	82	100%

Figure 2.1 shows age distribution used in this study

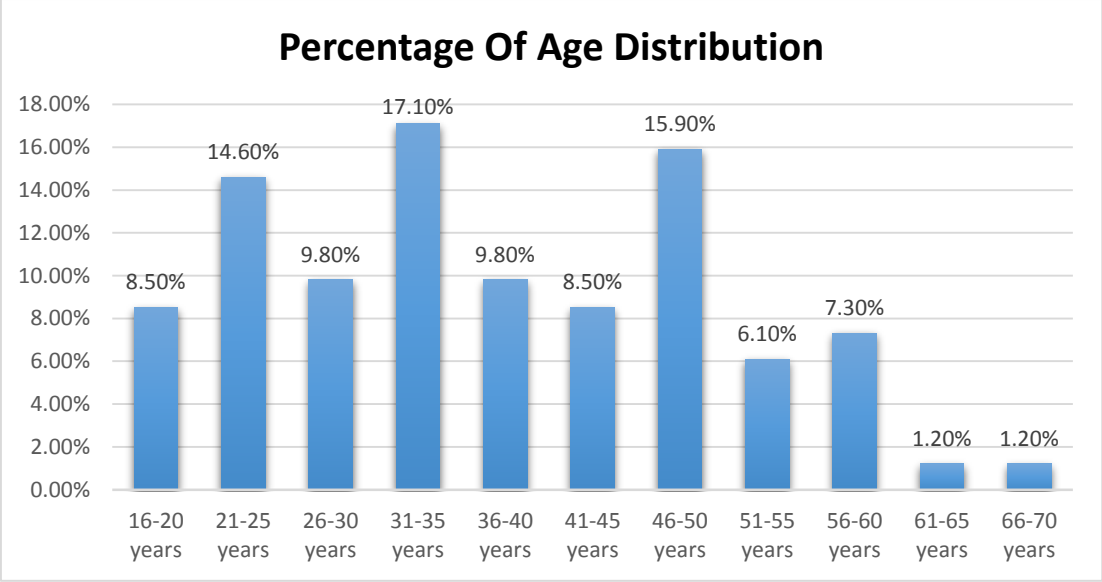

Figure 2-1. Age Distribution.

2.4.2 Gender Distribution.

Table 2.2 Distribution according to the Gender

Gender	Frequency	Percentage %
Male	62	**75.6**
Female	20	**24.4**
Total	82	**100**

Figure 2.2 shows the percentage of gender distribution used in this study

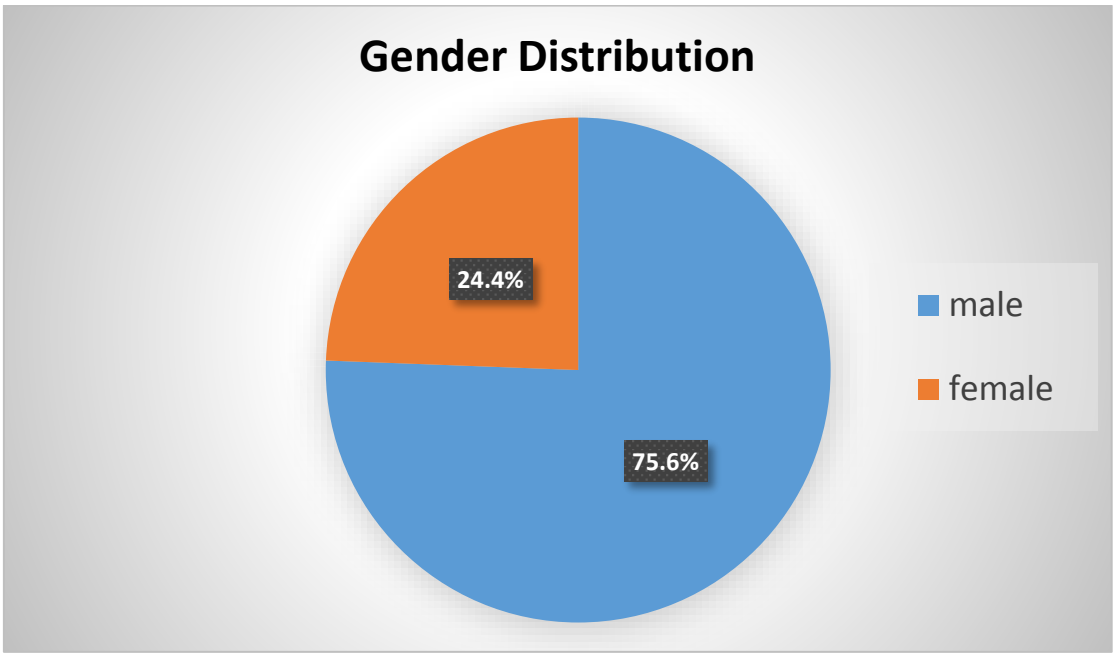

Figure 2-2. Gender distribution.

2.4.3 Distribution According To the Season

Table 2.3 cases according to the seasons

The Season	Frequency	Percentage %
Winter	37	**45.1**
Summer	45	**54.9**
Total	82	**100**

Figure 2.2 show cases according to the seasons.

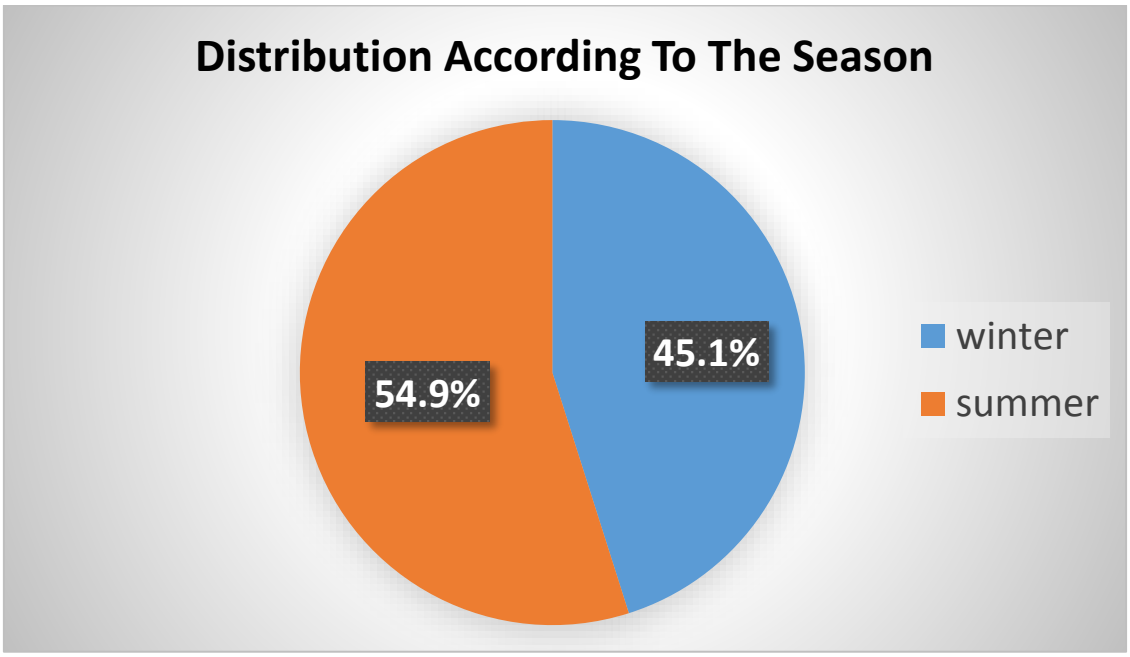

Figure 2-3. Cases according to the season.

2.4.4 Common clinical Features

Table 2.4 The commonest clinical features

Hypertension	Frequency	Percentage %
Flank Pain	53	**65.0**
Dysuria	9	**10.7**
Nausea/Vomiting	9	**10.7**
Hematuria	11	**13.6**
Total	82	**100**

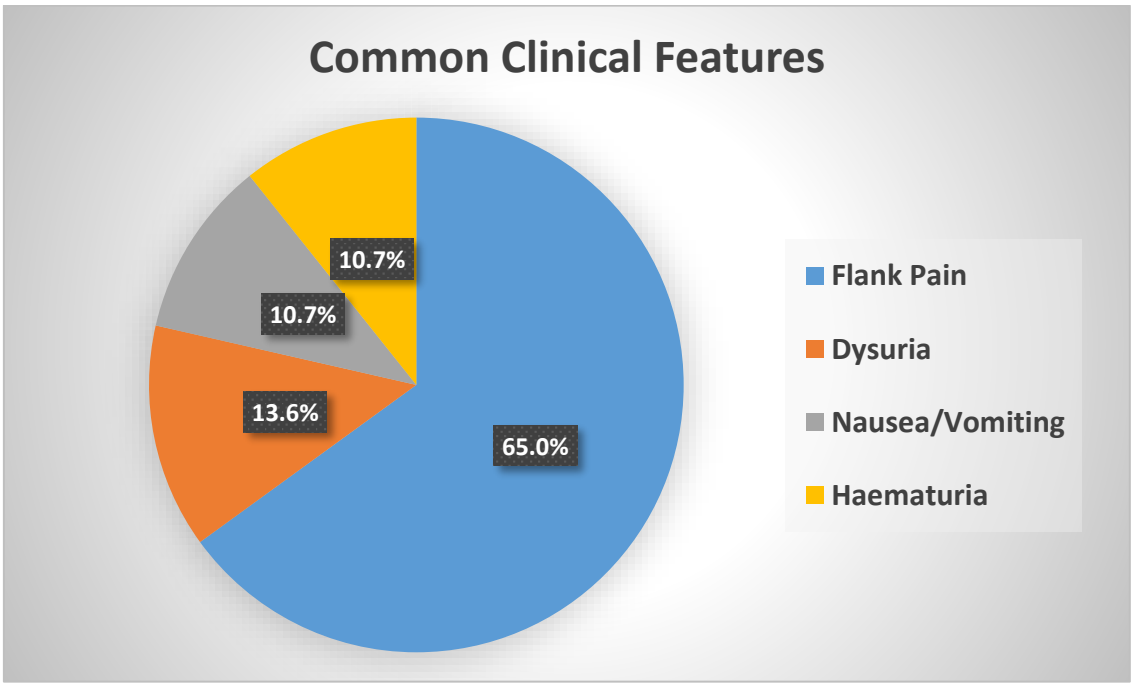

Figure 2.4 The commonest clinical features.

2.4.5 The Distribution of Hypertension

Table 2.5 Cases with or without hypertension

Hypertension	Frequency	Percentage %
Yes	16	**19.5**
No	66	**80.5**
Total	82	**100**

Figure 2-4 show cases with or without hypertension.

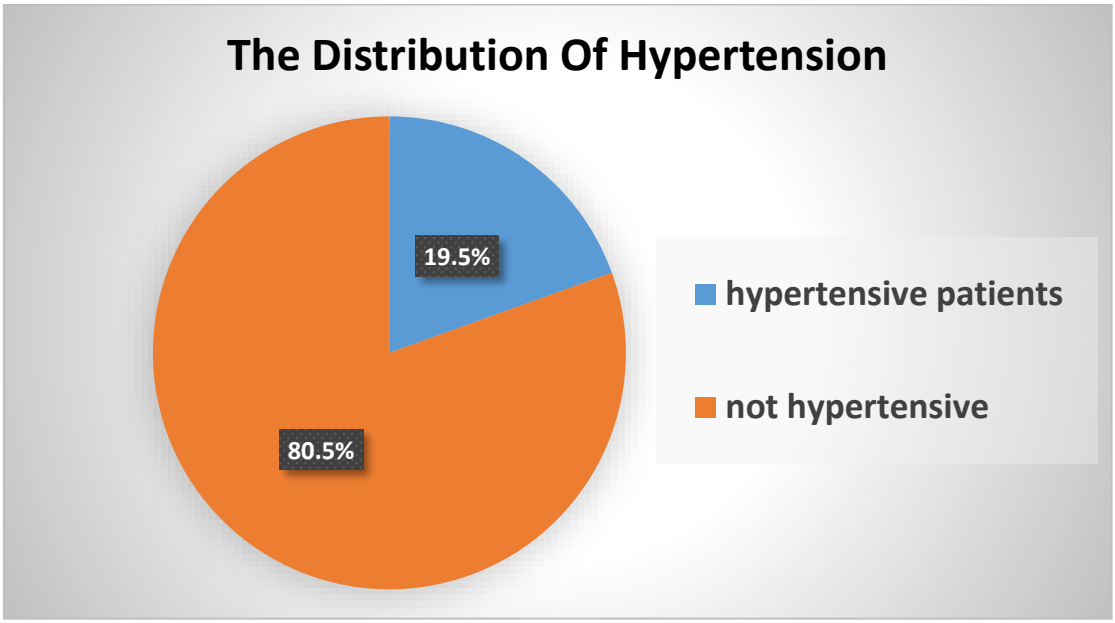

Figure 2-5. The Distribution of Hypertension

2.4.6 The Distribution of Diabetic Mellitus

Table 2.6 Cases with or without Diabetic Mellitus

Diabetic Mellitus	Frequency	Percentage%
Yes	7	**8.5**
No	75	**91.5**
Total	82	**100**

Figure 2.6 shows the distribution of cases with Diabetic Mellitus.

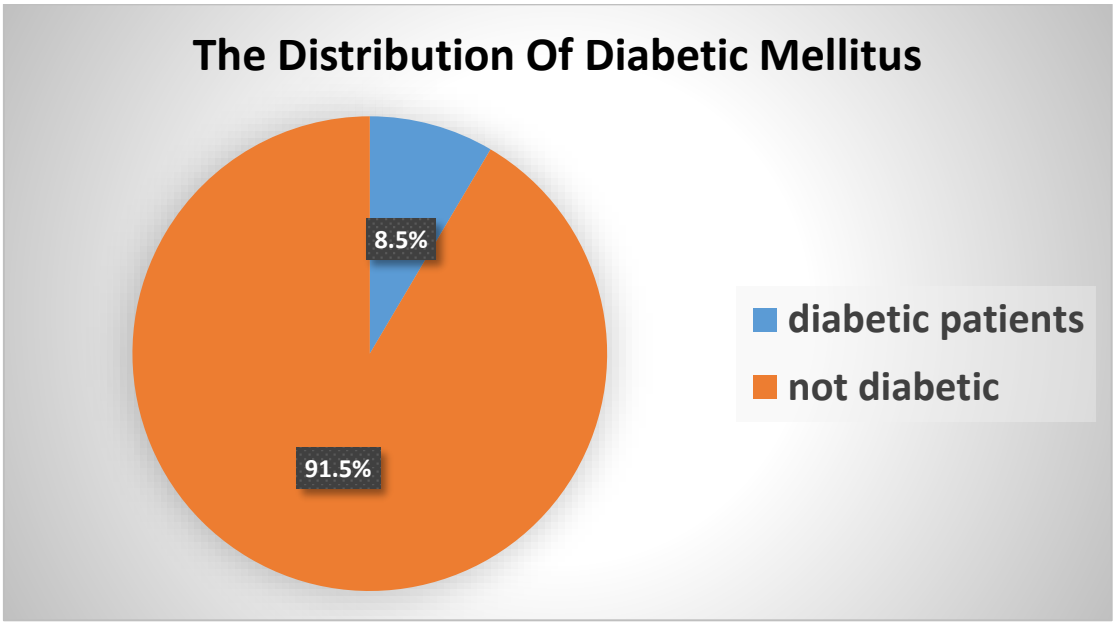

Figure 2-6. The Distribution of Diabetic Mellitus

2.4.7 Type of Anesthesia

Table 2.7 Cases according to Type of Anesthesia

Type Of G.A	Frequency	Percentage%
General Anesthesia	75	**91.5**
Spinal Anesthesia	7	**8.5**
Total	82	**100**

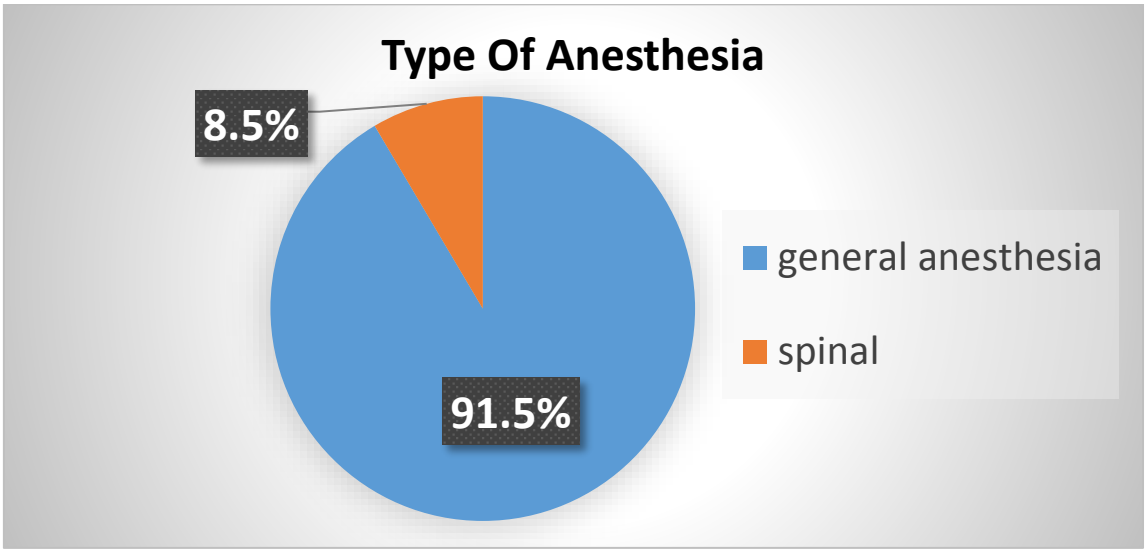

Figure 2-7. Type of Anesthesia

2.4.8 Distribution of Double J Insertion

Table 2.8 Cases according to Double J Insertion

Double J Insertion	Frequency	Percentage %
Yes	67	**81.7**
No	15	**18.3**
Total	82	**100**

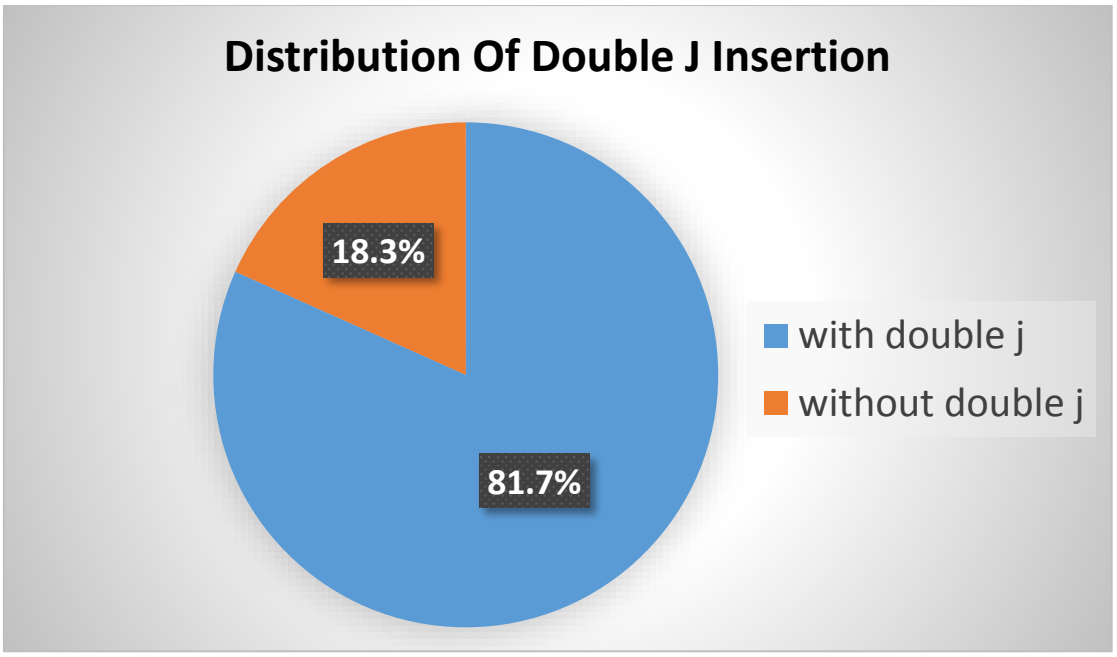

Figure 2-8. Distribution of Double J Insertion

2.5 DISCUSSION:

- Urolithiasis was more frequent in men than in women in our study. This observation is in accordance with studies conducted by (Naas ed al, 2001) [55] (Fetter et al,1963) [56] , (Almby et al,1975) [57] and (Juuit et al,1979) [58] which show that urolithiasis is predominantly seen among males compared with females.
- In our study, the maximum number of cases was between 31-35 years of age. This finding is in agreement with the observations made by (Romero et al., 2010)(59) (Kassimi et al,2001) [60] , (Hanash et al,1986) [61] , (Abomelha et al,1986) [61] and Naas et al. [55] , They observed that urolithiasis occurred more regularly in the third decade of life.

- Our study demonstrated that the patients with urolithiasis commonest presenting feature was flank pain. These findings are consistent with previous studies from various parts of the world (Stamatelou et al.2003) , (Ngugi et al.2010) and (Mkony et al.1993) [64],[65],[66].

- In our study the high incidence rate is reported in summer. Which is similar to khan et al. and this may be due to hot climate and low urine volume with increased chances of dehydration. But (Chen et al, 2008)[67] in their study conducted in Taiwan, observed that urinary calculi-related colic attacks

were seen in the winter months may be because there is typically more calcium in the urine during winter months.

- In our study only 8.5% of patients with renal urilithiasis have DM and 91.5% of patient with no history of DM. In study of (Taylor et al.2005) 250 patients with renal urolithiasis only 12 % of them have diabetes as co-morbidity with renal urolithiasis.[68] But in study of (Cameron et al.2006) the majority of patients with urolithiasis have DM may be due to metabolic features that also with DM.[69].

- In our study most of patients was normotensive this result is similar to study done by (Francesco et al.2003) 73.9% were normotensive, and the remainder 26.1% had hypertension.[70] But not similar to (Dollerv et al. 1960) study which show majority of cases have hypertension due to higher mean age group in his study and may be due to increased urinary calcium excretion was commonly detected in hypertension.[71].

- General anesthesia most common type was used for patients in our study and this result similar to study done by (Oliech et al.1998)[72].

- In our study the majority of patient need D-J insertion this result not similar to (Cevik et al.2010) reported that routine postoperative D-J stent is not mandatory this may be due stent-related complication [73]. In contrast, in

the CROES large retrospective study for (Muslumanoglu et al.2017) , postoperative DJ stent placement in urolithiasis treatment was associated with improvement of some clinical outcomes, such as fewer postoperative complications, compared with not stenting postoperatively.[74].

2.6 RECOMMENDATIONS

- Adapt more restricted criteria in DJ use.
- Encouraging patients to follow a different lifestyle and adhering to healthy dietary diets that limit the recurrent of the kidney stones or limit its appearance.
- Enhancement for medical records.

CHAPTER 3: REFERENCES

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