

**Comparative Study Between Ultrasound and Intravenous Urogram
in Diagnosis of Renal Stones
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**Comparative Study Between Ultrasound and Intravenous Urogram in
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دراسة مقارنة بين السونار والأشعة الملونة في تشخيص حصيات الجهاز البولي

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Abstract

Stones are a hard mass developed from crystals mineral material separate from the urine and formed within the kidney or the bladder , which may lead to block the flow of urine. This study concentrated on accuracy of intravenous urogram and Ultrasound in diagnosis of renal stones . A total number of patients was 75 (51 patient were males and 24 patient were females) their mean age was (30) year, all of them suffering from renal disease. They were collected from Teaching Baquba hospital. All patients were examined by ultrasound and intravenous urogram . The result of intravenous urogram were be: - 41 patient have kidney stones .

- 16 patient have stones in the ureter .

- 18 patient have bladder stones .

The result of ultrasound were be :

- 41 patient have kidney stones .

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- 11 patient have stones in the ureter
- 5 cases were diagnosed as healthy persons.
- 18 patient have bladder stones.

We conclude that the accuracy of intravenous urogram was 100 % while the accuracy of ultrasound was 93.3 % .

Keyword: Renal stones, I. V. U

الخلاصة

الحصىات هي كتل صلبة تتكون من بلورات صلبة صغيرة تتفصل عن الإدراج وتتكون في حوض الكلية أو المثانة وقد تحدث انسدادا" في مجرى الإدراج .تركزت هذه الدراسة على مدى دقة الأشعة الملونة والسونار في تشخيص حصى الجهاز البولي .

تم فحص 75 مريضا" (51 مريضا" من الذكور و24 مريضا" من الإناث) متوسط أعمارهم (30) سنة جميعهم يعانون من أمراض الجهاز البولي , تم فحصهم باستخدام الأشعة الملونة مرة وباستخدام السونار مرة أخرى. جمعت هذه العينات من مستشفى بعقوبة التعليمي . و كانت نتائج الفحص بالأشعة الملونة كالتالي :

- مجموعة الأشخاص المصابين بحصى الكلية وعددهم 41 مريضا"
 - مجموعة الأشخاص المصابين بالحصىات داخل الحالب وعددهم 16 مريضا" .
 - مجموعة الأشخاص المصابين بحصى المثانة وعددهم 18 مريضا" .
- وكانت نتائج الفحص بالسونار كالتالي :
- مجموعة الأشخاص المصابين بحصى الكلية وعددهم 41 مريضا" .
 - مجموعة الأشخاص المصابين بالحصىات داخل الحالب وعددهم 11 مريضا" .
 - مجموعة الأشخاص الذين شخّصوا بأنهم أشخاص أصحاء وعددهم 5 أشخاص .
 - مجموعة الأشخاص المصابين بحصى المثانة وعددهم 18 مريضا" .

من خلال النتائج التي حصلنا عليها نستنتج بان كفاءة الأشعة الملونة في تشخيص حصى الجهاز البولي 100 % بينما كفاءة جهاز السونار هي 93,3 % .

حصىات الجهاز البولي ,الأشعة الملونة للجهاز البولي

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Introduction

Stones are a hard mass developed from crystals mineral material separate from the urine and formed within the kidney or the bladder , they may lead to block the flow of urine,

Stones originated as microscopic particles or crystals and develop into stones over time [1]

There are many causes of forming kidney stones [2] :

1- Hyper calciuria : Increase blood level of calcium this leads to increase concentration of calcium in the urine and then formed stones .This increasing because:

A-Hyper thyroidism .

B-Hyper parathyroidism .

C- Excess intake of vitamin D .

2- Hyper oxaluria : For the following reasons:

A- Intake food rich with oxalate .

B- Digestive system disease such as crohn's disease .

3- Dehydration : It reduced fluid intake or strenuous exercise without adequate fluid replacement , this increases the risk of kidney stones

4- Hyper uricosuria : These occur when increased amounts of uric acid in the blood stream and when concentration of uric acid become very high , a kidney stones are formed [3] .

5-Some medications : there are some drugs that raise the risk of kidney stones , these medications include some diuretics , calcium containing antacids and the protease inhibitor [4] .

6- Cystine stones : there are rarest of all and result from a disorder of amino acid metabolism

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Cystinuria [5] .

7- Primary renal disease :This diseases are inherited such as :

A- Polycystic kidney diseases.

B- Medullary sponge kidney .

C- Renal tubular acidosis .

D- Nephrocalcinosis .

There are many causes of forming bladder stones [6] :

1- Bladder outflow obstruction .

2- Urethral stricture .

3- Neuropathic bladder .

4- Prostatic hypertrophy

5- Foreign bodies in the bladder , such as catheter .

Ultrasound is cyclic sound pressure with frequency greater than the upper limit of human hearing , it is approximately 20 KZ .Medical sonography is effective for imaging soft tissues of the body [7] .

In ultrasound device , the transducer part are both sends the sound waves and records the echoing waves, when the transducer is pressed against the skin , it directs small pulses of high frequency sound waves into the body , the sound waves is partially reflected anywhere there are density change in the body , the reflections sound return to the transducer and the reflected sound waves vibrate the transducer and then vibration turn into electrical pulses that travel to the ultrasonic computer where they are processed and displayed [8] .

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X- rays are electromagnetic radiation that is capable of causing ionization in matter due to it's high energy content , it can penetrate the body to allow non invasive visualization of the internal anatomy[9].

X- ray can not penetrate all materials with the same ability , the denser tissues such as bones absorb X-ray and will be whiter image in the X-ray picture while other soft tissues are readily penetrated and appear darker gray in the X-ray picture , when the density of adjacent tissues is similar , a radiopaque contrast agent is often added to one tissues or structure to differentiate it from its surroundings [10] .

Intravenous urogram (I.V.U) is an X – ray test that can show the size , shape and position of the urinary tract during this examination a dye called contrast material is injected into a vein [11] .

The aim of this study is to detect the efficiency of ultrasound and Intravenous urogram in diagnosis of renal stones and comparison between them .

Patients and methods

All patients included in this study were suffering from renal diseases . They were collected randomly from Teaching Baquba hospital from November 2009 to April 2010 . A total number of (75) patients (51 males and 24 females) . The range of age between (15 - 85) year and their mean age was (30) year .Their cases notes and the sonography were the initial diagnostic study in all cases and then the radiological examination was done .

Methods of examinations

1- Ultrasound investigation : Patient is placed supine and put a gel on the area of the body being examined to help the transducer make secure contact with the body and eliminate air pockets between the transducer and the skin and pressed the transducer firmly against the skin and sweeps it over the area of interest .

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2 – Radiological investigation :The following steps should be done before the radiological investigation :

- Ask the patient take a mild laxative (either pill or liquid form) the evening before the procedure.
- The patient instructed not to eat or drink after midnight on the night before the examination .
- Injecting iodine dye into the vein , it is usually more reliable and told the patient to lie down on the X – ray couch , the patient will be asked to hold breath and don't move and then a series of X- ray pictures are taken at time intervals .

Results

Table (1): Age distribution according to gender of patients.

| Age | Total number of patients | | Males | | Females | |
|---------|--------------------------|------|-------|------|---------|-----|
| | Pt. | % | Pt. | % | Pt. | % |
| 10 – 19 | 11 | 14.7 | 8 | 10.7 | 3 | 4 |
| 20 – 29 | 26 | 34.7 | 19 | 25.3 | 7 | 9.4 |
| 30 – 39 | 14 | 18.6 | 9 | 12 | 5 | 6.6 |
| 40 – 49 | 11 | 14.7 | 7 | 9.4 | 4 | 5.3 |
| 50 – 59 | 4 | 5.3 | 4 | 5.3 | --- | --- |
| 60 – 69 | 3 | 4 | 1 | 1.3 | 2 | 2.7 |
| 70 – 79 | 2 | 2.7 | 2 | 2.7 | --- | --- |
| 80 – 90 | 4 | 5.3 | 1 | 1.3 | 3 | 4 |
| Total | 75 | 100 | 51 | 68 | 24 | 32 |

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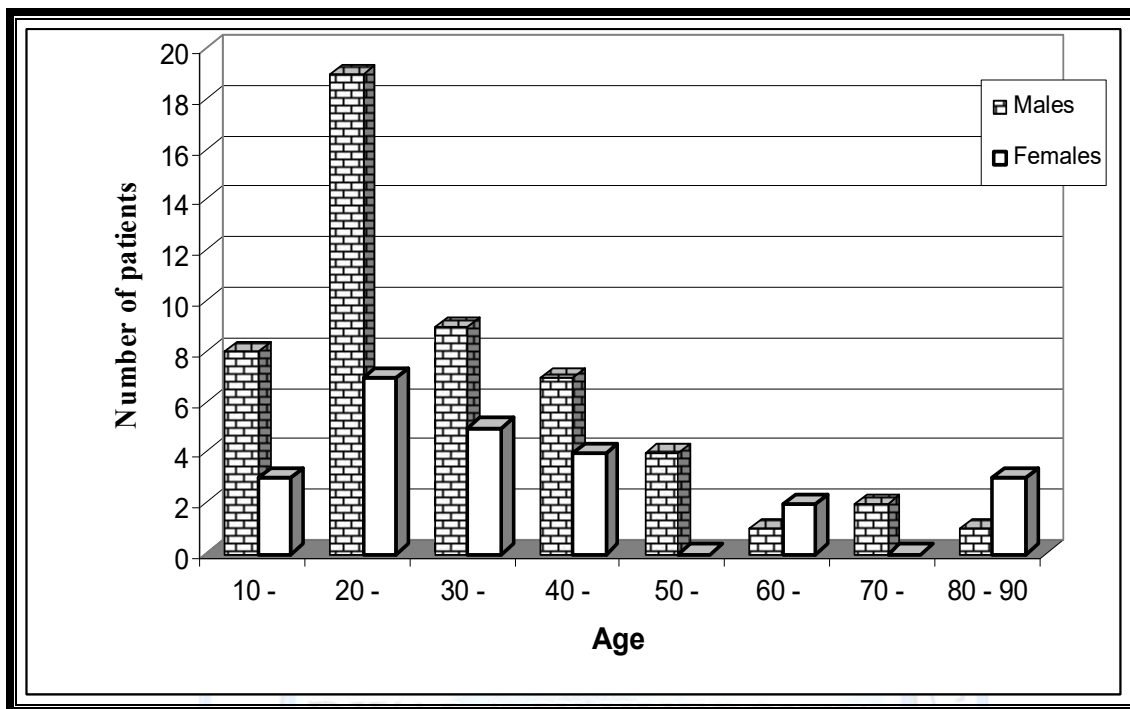


Figure (1): Age distribution according to gender of patients.

Table (2): Age distribution according to Site of renal stones examined by I.V.U .

| Age | Total number of patients | Site of Renal Stones | | |
|---------|--------------------------|----------------------|--------|---------|
| | | Kidney | Ureter | Bladder |
| 10 – 19 | 11 | 6 | 3 | 2 |
| 20 – 29 | 26 | 14 | 5 | 7 |
| 30 – 39 | 14 | 5 | 3 | 6 |
| 40 – 49 | 11 | 5 | 3 | 3 |
| 50 – 59 | 4 | 2 | 2 | --- |
| 60 – 69 | 3 | 3 | --- | --- |

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| | | | | |
|---------|----|----|-----|-----|
| 70 – 79 | 2 | 2 | --- | --- |
| 80 - 90 | 4 | 4 | --- | --- |
| Total | 75 | 41 | 16 | 18 |

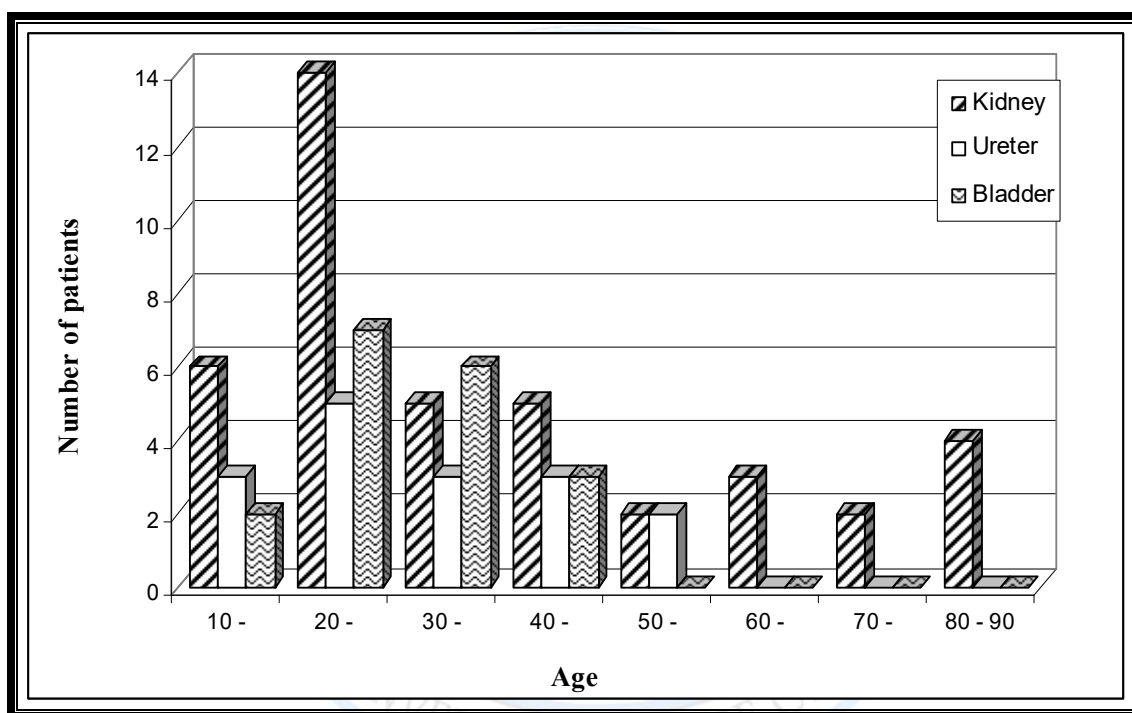


Figure (2): Age distribution according to Site of renal stones examined by I.V.U.

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Table (3): Age distribution according to Site of renal stones examined by ultrasound.

| Age | Total number of patients | Site of Renal Stones | | | |
|---------|--------------------------|----------------------|----------------|----------------|---------|
| | Pt. | Kidney | Ureter | | Bladder |
| | | Pt. | (+ ve) finding | (- ve) finding | Pt. |
| 10 – 19 | 11 | 6 | 1 | 2 | 2 |
| 20 – 29 | 26 | 14 | 3 | 2 | 7 |
| 30 – 39 | 14 | 5 | 3 | --- | 6 |
| 40 – 49 | 11 | 5 | 2 | 1 | 3 |
| 50 – 59 | 4 | 2 | 2 | --- | --- |
| 60 – 69 | 3 | 3 | --- | --- | --- |
| 70 – 79 | 2 | 2 | --- | --- | --- |
| 80 - 90 | 4 | 4 | --- | --- | --- |
| Total | 75 | 41 | 11 | 5 | 18 |

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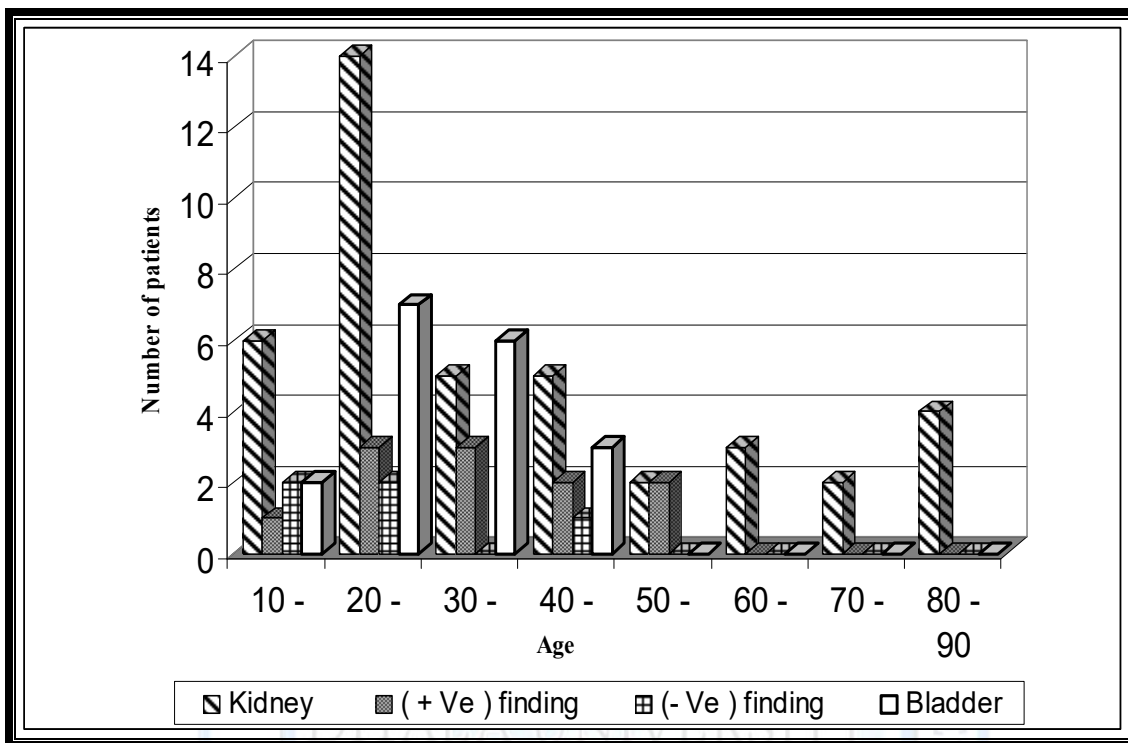


Figure (3): Age distribution according to Site of renal stones examined by ultrasound.

Table (4): The relationship between gender of patients with site of renal stones.

| Gender of patients | Site of renal stones | | | Total |
|--------------------|----------------------|--------|---------|-------|
| | Kidney | Ureter | Bladder | |
| Males | 31 | 6 | 14 | 51 |
| Females | 10 | 10 | 4 | 24 |
| Total | 41 | 16 | 18 | 75 |

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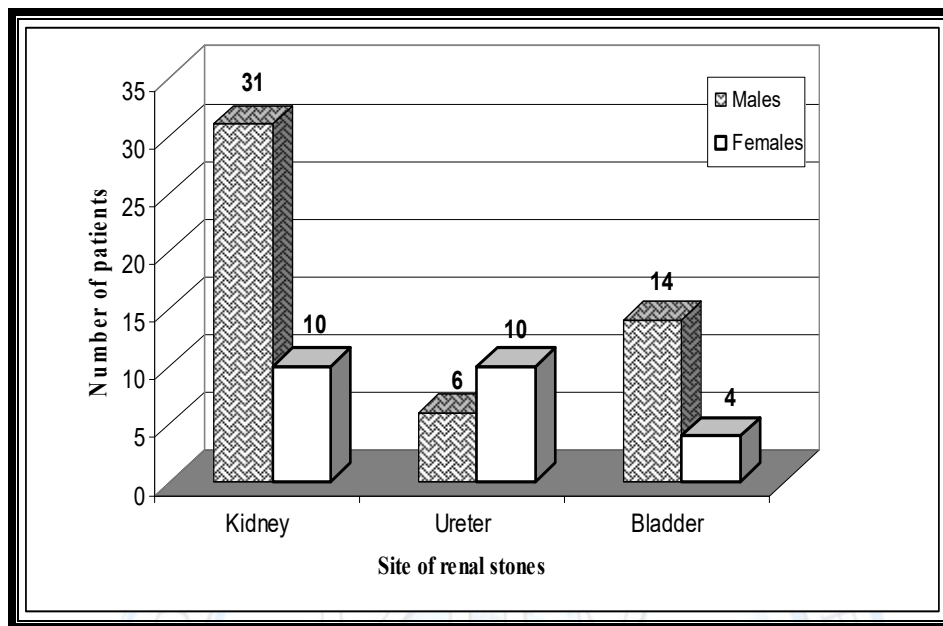


Figure (4): The relationship between gender of patients with site of renal stones.

Table (5): Radiological and Ultrasound finding comparison

| Age | Radiological examination I.V. U | | Ultrasound examination | |
|---------|------------------------------------|------|------------------------|------|
| | Pt. | % | Pt. | % |
| 10 – 19 | 11 | 14.7 | 9 | 12 |
| 20 – 29 | 26 | 34.7 | 24 | 32 |
| 30 – 39 | 14 | 18.6 | 14 | 18.7 |
| 40 – 49 | 11 | 14.7 | 10 | 13.3 |
| 50 – 59 | 4 | 5.3 | 4 | 5.3 |
| 60 – 69 | 3 | 4 | 3 | 4 |
| 70 – 79 | 2 | 2.7 | 2 | 2.7 |
| 80 – 90 | 4 | 5.3 | 4 | 5.3 |
| Total | 75 | 100 | 70 | 93.3 |

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Discussion

1- Gender distribution : The total number of patients 75 cases , (51) patients (68 %) were males and (24) patients (32 %) were females Table (1) , so the males were more affected than the females for the following reasons [12] :

- the larger muscle mass as compared to women , thus the daily breakdown of the tissue results in increased metabolic waste and predisposition of stone formation .
- the other more significant cause is because of the male urinary tract being more complicated than the female urinary tract .
- the enlargement of the prostate gland as men grow older can result in a condition which can result in difficulty in emptying the bladder with the obstruction of the bladder outflow , crystals and stones may be formed .

2- Age distribution : The seventy five patients were studied , their age ranging from (15 – 85) year , we found most of patient with renal stones were in the age between (20 – 29) year (19 patients were males and 7 patients were females) Table (1) , we noted at this age the probability of stones formation increased this may be because of diet and occupations , this result is adequate to the study done by Mohammed & majida [13] .

3- Site of stones : 41 of our patients have kidney stones , 16 patients have stones in the ureter and 18 patients have bladder stones ,that mean most renal calculi are located in the kidney ,that is in agreement with Haddad et al [14] .

4- Intravenous urogram and Ultrasound Finding : Seventy five patients (100 %) showed positive finding , we noted that 41 patient have kidney stones , 16 patients have stone in the ureter and 18 patients have stones in the bladder while in ultrasound examination , seventy patients (93.3 %) were diagnosed with renal stones : 41 patient have kidney stones ,11 patient have stones in the ureter and 5 patient was diagnosed as healthy person (negative finding) and 18 patient have bladder stones, there are some stones be difficult to demonstrated in the upper part of ureter due to gases or due to the relatively small size of the stone compared to the beam width [5] .

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Conclusions

- 1- Intravenous urogram has high accuracy in diagnosis of renal stones.
- 2- The commonest site for renal stones was kidney .
- 3- Their was no relation between site of renal stones and age of patients .

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