



SHORT COMMUNICATION

“Review on Kidney Stones”***Satyanand Tyagi¹, Patel Chirag J², Patel Jaimin², Tarun Parashar³, Soniya³**¹President, Tyagi Pharmacy Association & Scientific Writer (Pharmacy), Chattarpur, New Delhi, India-110074.²Department of Pharmaceutics, Maharishi Arvind Institute of Pharmacy, Mansarovar, Jaipur, Rajasthan, India-302020.³Department of Pharmaceutics, Himalayan Institute of Pharmacy and Research, Rajawala, Dehradun, Uttarakhand, India-248001.

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**ABSTRACT**

Kidney stones (renal lithiasis) are small, hard deposits of mineral and acid salts developed from crystals that separate from the urine within the urinary tract. The most common type of stone contains calcium in combination with either oxalate or phosphate. They can vary in size and location. Very small stones can pass through the urinary system without causing problems. However, larger stones, when traveling from the kidney through the ureters to the bladder, can cause severe pain called colic. The pathogenetic mechanisms of kidney stone formation are complex and involve both metabolic and environmental risk factors. The pain kidney stones cause typically starts in side or back, just below your ribs, and radiates to lower abdomen and groin. Kidney stones are easy to diagnose for those with a sudden onset of pain, blood in the urine and stones that show on x-ray. Studies have shown that 15% of those with a stone develop another within a year and 33% within 5 years. These rates can be halved by drinking more than 2 liters of fluid each day.

KEYWORDS: Kidney stones, Urinary system, Water, Pain, Diagnosis**INTRODUCTION:**

The urinary system is made up of the kidneys, the ureters, the bladder, and the urethra (Figure no. 1). Each plays an important role in helping body to eliminate waste products in the form of urine (1, 2). The urinary tract, or system, consists of the kidneys, ureters, bladder, and urethra. The kidneys are two bean-shaped organs located below the ribs toward the middle of the back, one on each side of the spine. The kidneys remove extra water and wastes from the blood, producing urine. They also keep a stable balance of salts and other substances in the blood. The kidneys produce hormones that help build strong bones and form red blood cells. Narrow tubes called ureters carry urine from the kidneys to the bladder, an oval-shaped chamber in the lower abdomen. Like a

balloon, the bladder's elastic walls stretch and expand to store urine. They flatten together when urine is emptied through the urethra to outside the body (3, 4). Scientists have found evidence of kidney stones in a 7,000-year-old Egyptian mummy. A kidney stone can develop when certain chemicals in your form crystals those stick together. The crystals may grow into a stone ranging in size from a grain of sand to a golf ball. Most stones form in the kidneys. Most stones (70 to 80 %) are made of calcium oxalate. A smaller number are made of uric acid or cystine (5, 6). The prevalence of urolithiasis is approximately 2 to 3 percent in the general population, and the estimated lifetime risk of developing a kidney stone is about 12 percent for white males. One in ten men and one in 35 women develop a kidney stone in their lifetime. Some

people keep getting kidney stones throughout their lives. urinary calculi have a recurrence within 10 years (8). (7), approximately 50 percent of patients with previous

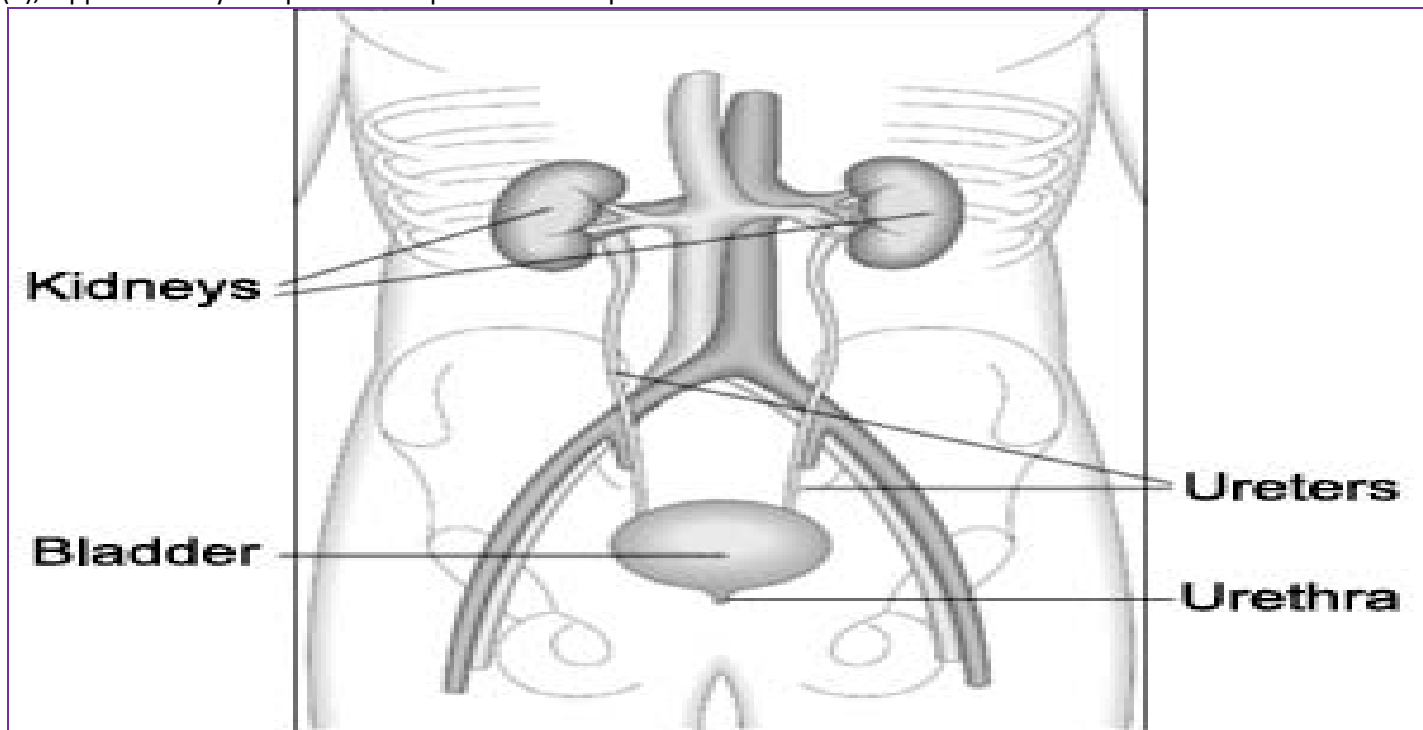


Figure No. 1: The urinary system

Stone location	Common symptoms
Kidney	Vague flank pain, hematuria
Proximal ureter	Renal colic, flank pain, upper abdominal pain
Middle section of ureter	Renal colic, anterior abdominal pain, flank pain
Distal ureter	Renal colic, dysuria, urinary frequency, anterior abdominal pain, flank pain

Table No.1: Relationship of stone location to Symptoms

COMMON SYMPTOMS (9, 10):

Kidney stones can cause intense pain and blockage as they pass downwards. Any or some of the following symptoms are noticed:

1. Severe loin pain that comes and goes (in the back or side between the pelvis and lower rib). This is known as renal colic. The pain can move down into the groin or genitals
2. Nausea and vomiting
3. Sweating, fever and shivers
4. Difficulty in passing urine
5. Visible or microscopic traces of blood in the urine
6. Infection of the kidneys is more likely if stones are present.

DIFFERENT TYPES OF KIDNEY STONES (11, 12):

There are four main kinds of kidney stones. Each type has a different cause. Each may need a different kind of treatment or prevention. The four types are:

1. **Calcium-Oxalate:** These are the most common kidney stones. They can be caused by eating too much calcium or vitamin D, some medicines, genetics and other kidney problems.
2. **Struvite:** These stones affect women more than men. They can grow very large and may harm the kidneys more than other stones. Having kidney infections often may cause struvite stones.
3. **Uric Acid:** These stones may be caused by eating too much animal protein or by genetics. To stop uric acid stones, try eating less red meat.
4. **Cystine:** These stones are very rare. They are caused by cystinuria, a genetic kidney disease.

CAUSES OF KIDNEY STONES (13, 14):

1. Consuming too much calcium oxalate or food high in uric acid in your diet
2. Drinking too little fluid

3. Blockage of the urinary tract
4. Consuming too much Vitamin C or D
5. Bed rest for several weeks or more
6. Recurrent urinary tract infections
7. Certain medications
8. Certain metabolic diseases

2. If necessary, stones can be removed using the techniques of 'keyhole' surgery. This procedure is known as 'nephrolithotomy'.
3. Ureteroscopic Stone Removal uses a small tool to get and remove stones stuck in the ureters.
4. Staghorn calculi or other very large stones may require conventional surgery.

DIAGNOSIS OF KIDNEY STONES (9, 15, 16):

Kidney stones are easy to diagnose for those with a sudden onset of pain, blood in the urine and stones that show on x-ray. For others, diagnosis is less straight forward as:

1. Plain x-rays do not 'see' stones not made of calcium, like those containing uric acid. Small stones and those in front of bones do not show up either
2. Intravenous urography (IVU) is an older test that may be used for stones that X-ray cannot show. Dye is injected into a vein and X-ray studies are taken as it passes through the kidneys. Any problems with the passage of urine out of the body also show
3. CT scanning shows all stones well
4. Ultrasound scanning is less good at seeing stones but can show if a blockage is present. It is an option in pregnancy
5. Levels of calcium and uric acid in the blood will be examined
6. Any stone passed out of or removed from the body is analyzed to identify the constituents.

TREATMENTS OF KIDNEY STONES (17, 18, 19):

Treatment depends on the location and size of the kidney stone. Drinking plenty of water and taking some medicines can help a small stone to pass more easily.

1. management of pain
2. medication to relieve any nausea
3. intravenous fluids may be given if needed
4. the diagnosis will be confirmed using the tests detailed above
5. Small stones (smaller than 5mm) usually pass by themselves within 72 hours. Any stones should be kept for analysis
6. Tests are repeated to confirm that the stone has passed out of the body.

Stones of up to 9 mm in size may pass, but those larger will not and more active treatment is needed. This is urgent if a blockage occurs.

1. Extracorporeal shockwave lithotripsy (ESWL) – often used when stones are in the kidney or upper ureter. The 'shock' waves are aimed towards the stone from a probe placed outside the body. The stone breaks into small pieces and leaves the body naturally

PREVENTION OF KIDNEY STONES (20-23):

If you have had a kidney stone, there is strong possibility you will have another kidney stone in the future.

1. Studies suggest that you can halve your risk of forming another stone by drinking two litres of water a day. If your urine is dark yellow you are not drinking enough.
2. Decrease protein and salt intake.
3. If you have uric acid stones, cut down on the amount of red meat you eat.
4. Treatment with 'thiazide' diuretics to reduce the amount of calcium lost in the urine. This discourages the formation of calcium stones
5. Treatment with allopurinol reduces production of uric acid in the body.
6. Changes in your diet are only advised for some causes of kidney stones.

CONCLUSION

Kidney stones can cause disabling pain, bleeding and infection in the kidneys. Normally, urine contains chemicals that prevent or inhibit the crystals from forming. These inhibitors do not seem to work for everyone, however, so some people form stones. If the crystals remain tiny enough, they will travel through the urinary tract and pass out of the body in the urine without being noticed. Certain types of stones can be dissolved using medication. However, the most common stones (those containing calcium) cannot be dissolved. Stones that do not pass by them may have to be removed if they are stuck in the lower part of the ureter, or crushed with Extracorporeal Shock Wave Lithotripsy (ESWL). Medical intervention-apart from pain medication-is often unnecessary.

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