



“REVIEW ON: Kidney Stone Dissolution For The Help Of Citric Acid”

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Abstract: kidney stone is one of the most common urological disorders and one of the oldest disease, which affects 10-12% of the world population. Pathophysiology of the disease includes urine supersaturation which promotes nucleation and aggregation of crystal then crystal retention occurs in the epithelium of urinary tract leads formation and growth of stone. Lithiasis is a term used for formation of stone in the urinary tract system. Stone can be in range from “A grain of sand to a pearl” with some “as big golf balls”. Calcium containing calculi are the most common comprising about 80% of all urinary calculi, rest 20% are of other type. Ten small prospective clinical studies found that orange grapefruit, and lemon juices all increased urinary citrate levels. Only orange and grapefruit juices had an alkalinizing effect on urine pH. Orange juice and grapefruit juices significantly increased urinary oxalate levels, while orange juice also had a high carbohydrates content. The signification of citrate in the pathogenesis and medical treatment of bone illnesses connected to renal stone formation is explored. The processes by which citrate affects bone health and its potential therapeutic applications in the treatment of renal stone disease are investigated in their study. To explore the relationship between citrus fruit juices [oranges, grapefruits, and lemonades] and kidney stone diseases [KSD].

Index Terms - lemonade, grapefruit citrate, nephrolithiasis, kidney calculi, risk.

I. INTRODUCTIONVEL

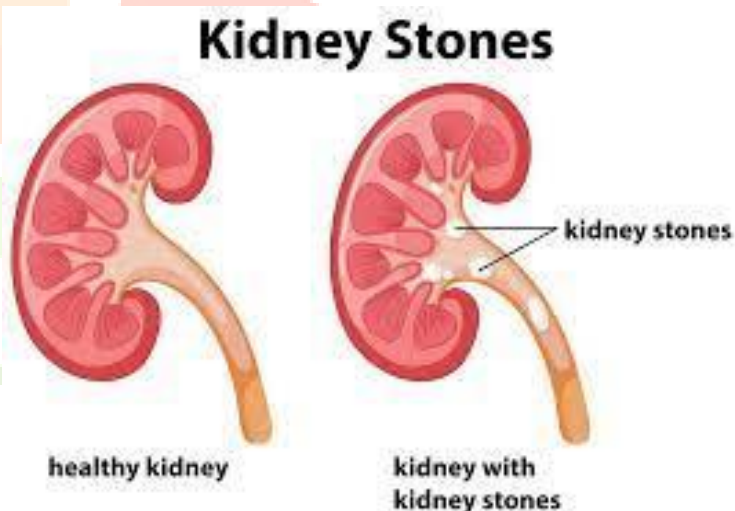
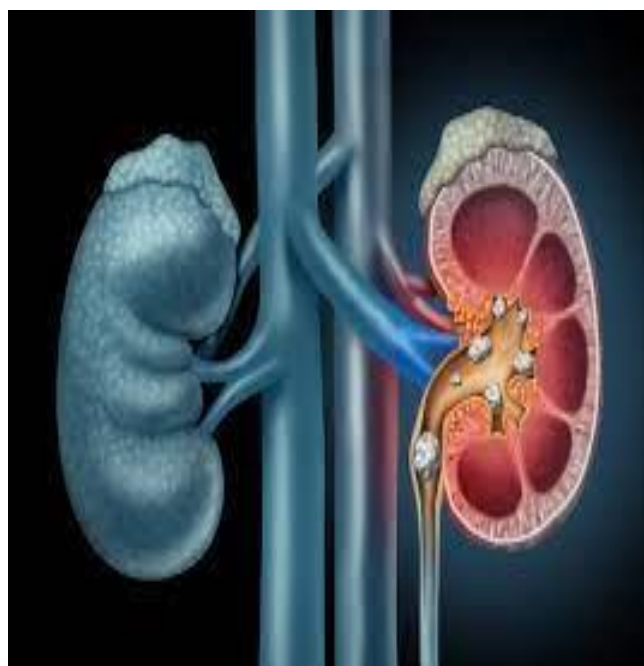
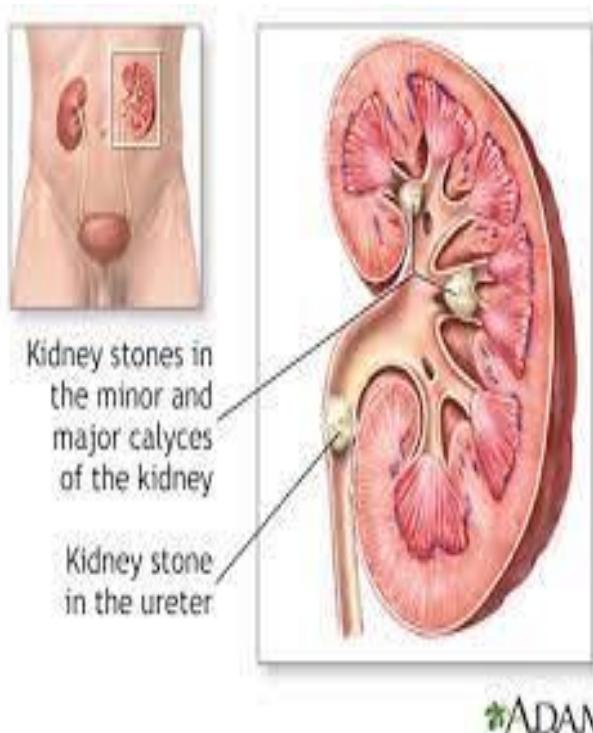
1.1.Kidney stone

Kidney are mainly lodged in the kidneys(1). It is the most commeon disease of urinary tract. The prevention of renal stone recurrence remain to be serious problem in human health(2). Kidney stone disease also known as nephrolithiasis or urilithiosis is one of the oldest disease known to

medicine. It is estimated that 1-15% individuals suffers from kidney stone formation at some point during their lifetime and the prevelance and incidence of kidney stone is reported to be increasing worldwide (3,4). A recent study concluded that the prevelance of kidney stone was 5-8% among adults (6-5% in men and 5.1% in women) with about 1 in 17 adult currently affected(5). Without proper treatment kidney

stone can cause the blockage of the ureter, blood in urine, frequent urinary tract infection, vomiting or painful urination, culminating in the permanent functional damage of the kidney(6). Kidney stones were associated with an increased risk of chronic renal disease, renal failure at the end of the stage, cardiac disease, diabetes and hypertension. Kidney stone signs are linked to the destination in the kidney, ureter, or urinary bladder. Initially there is no sign of stone creation eventually stone disorder clinical signs consist of renal colic (intense cramping pain), flank pain (back pain), hematuria (bloody urine) obstructive uropathy (urinary tract disease). Infection of the urinary tract blockage of flow of urine and hydronephrosis (kidney dilation). These conditions can contribute to nausea and vomiting induced by stone event(7). A study done in Saudi Arabia found a strong correlation between urinary stone colic and both temperature and atmospheric pressure. The result showed a steady increase in urinary stone colic in the hot season with maximum rate in the months of June, July and August (8) in the past few decades, it has been widely documented that kidney stone disease is a global health problem and seriously affects human health. Kidney stone disease is common in the population of industrialized countries.(9) The modern lifestyle provides a host of factors that impair urine composition and thereby increase the risk of stone formation. In our everyday life, we do not drink enough water and only twice or thrice a day we eat food that is too rich in calories and table salt but has deficiencies in fibre and alkali. Last but not least, we do not exercise enough, recent work

showed that being overweight is a crucial risk factor with significant impact on stone formation.(10). The chemical composition of kidney stones depends on the abnormalities in urine composition of various chemicals. Stones differ in size, shape and chemical composition (11) calcium oxalate stones – A reduction in urine oxalate reduces the supersaturation of calcium oxalate. In patients with the common form of nephrolithiasis, avoiding high dose vitamin C supplements is the only strategy that reduces endogenous oxalate production. Firstly, food that contains high amounts of oxalate should be avoided e.g. spinach, rhubarb and potatoes. The absorption of oxalate is reduced by higher calcium intake; therefore individuals with higher than desired urinary oxalate should be counselled to consume adequate calcium. Citrate is a natural inhibitor of calcium oxalate and calcium phosphate stones. More consumption of food more than that are rich in alkali (i.e. fruit and vegetables) should be encouraged.(12,13,14) magnesium ammonium phosphate stones – struvite stones occur to the extent of 10-15% and also have been referred to as infectious stones and triplet phosphate stones. It occurs among patients with chronic urinary tract infection that produce urease, the common being *Proteus mirabilis* and less common pathogens include *Klebsiella pneumoniae*, *Pseudomonas aeruginosa* and *Enterobacter*.(15,16). Cystine stones – These stones comprise less than 2% of all stone types. It is a genetic disorder of transport of an amino acid and cystine. It results in an excess of cystinuria in urinary excretion.(17,18)



1.2.Liquid dosage forms

Liquid of a dose of a chemical compound used as a drug or medication intended for administration or consumption. May be administered systemically by mouth or injected, by using different techniques, into the skin, muscles, or veins. kidney

1.2.1.Advantages :

- 1) Better for patients who have trouble swallowing.
- 2) Faster absorption than solids.
- 3) More flexibility in achieving the proper dosage of the medication.

1.2.2.Disadvantages:

- 1) Shorter life before expiration than other dosage forms.
- 2) more difficult to administer
- 3) harder to measure accurately
- 4) may have special storage requirement

Liquid formulations have been widely used in pharmaceuticals due to their high dosing flexibility, ease of swallowing, and quick onset of action. Typically, they are categorized as monophasic and biphasic formulation, wherein within these two broad categories lies a wide range of dosage forms. In a monophasic liquid the active pharmaceutical ingredient (API) is completely

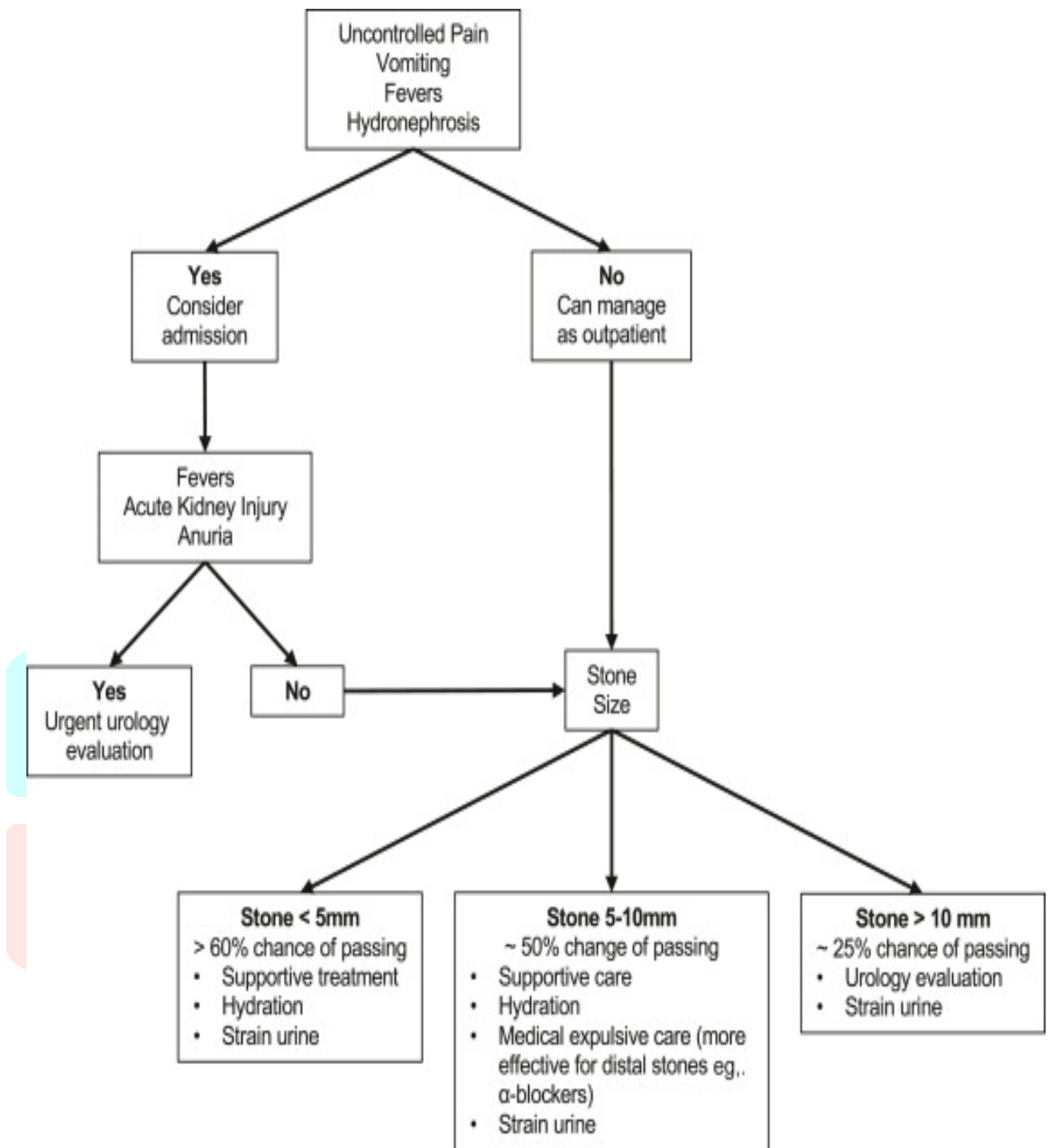
dissolved within the vehicle, while in the case of biphasic liquids, the API does not completely dissolve and instead is suspended or dispersed within the vehicle, forming two phases(19).UpH above 6.0 is essential for CaP crystallization due to greater availability of divalent phosphate ion to form poorly soluble complexes with calcium(20).Potassium citrate (k3 cit) has been shown to prevent recurrence of diverse stone types, but has not specifically been evaluated as therapy for CaP sfs(21,22,23,24,25,26).The EAU and AUA guidelines provide dietary recommendation to avoid stone formation and recurrence. Accordingly, moderation of salt, protein, oxalate, uric acid, and calcium consumption is needed, along with the necessary fluid intake to produce at least 2-2.5 L of urine per day(27,28) Kidney stone disease has increased in prevalence in recent decades, affecting around 10-14% of the population in industrialized nations. This increase is in part attributed to the dietary changes that occurred in the last century worldwide.(29,30).citric acid has many application including in flavouring, buffering and as a chelating agent in food and beverages. It is also used as pH regulator(31). Citric acid is a weak tricarboxylic acid found in citrus fruit like lemon which contain 7-9% citric acid according to their dry weight. The three carboxylate groups of citric acid monohydrate have diff pica values namely 3.15, 4.7.8and 6.40 (32)

2.Pathophysiology:

stone growth start with the formation of crystals in supersaturated urine which then adhere to the

urothelium, thus creating the nidus for subsequent stone growth. The biological processes that anchor crystals to the grothelium are incompletely understood. Many, but not all, calcium oxalate stone develop on randallis plaques which are composed of calcium phosphate (= hydroxyapatite) crystals. These grow to erode the grothelium, forming a nucleus for calcium oxalate deposition. More recent theories focus on the role of cell surface molecules which favour or inhibit crystal adhesion.(33,34).urothelial injury and repair after stone episode may increase surface expression of these molecules to favour further crystal adhesion.(35). Thus ‘stones beget stones’(36). Because there may be a residual nucleus on which further stones may form and or upregulation of molecules favouring crystal adhesion. Stone prevention focuses on identifying and ameliorating the risk factors for crystal formation.





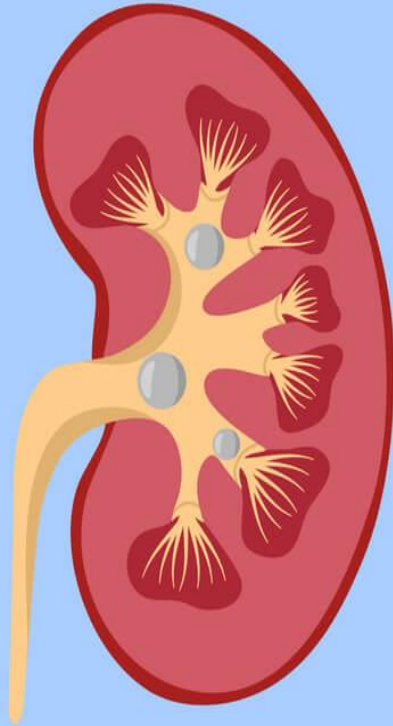
3.SYMPTOMS:

You may have kidney stones without even knowing it. Cause symptoms only when they become large or get stuck in the ureter

Symptoms may include:

- Lower back pain
- Nausea
- Vomiting
- Hematuria
- Increased frequency and urgency to urinate
- Stomach pain
- Fever
- Dizziness

SYMPTOMS OF KIDNEY STONE



STOMACH PAIN



BACKACHE



VOMITING



DIZZINESS



FEVER

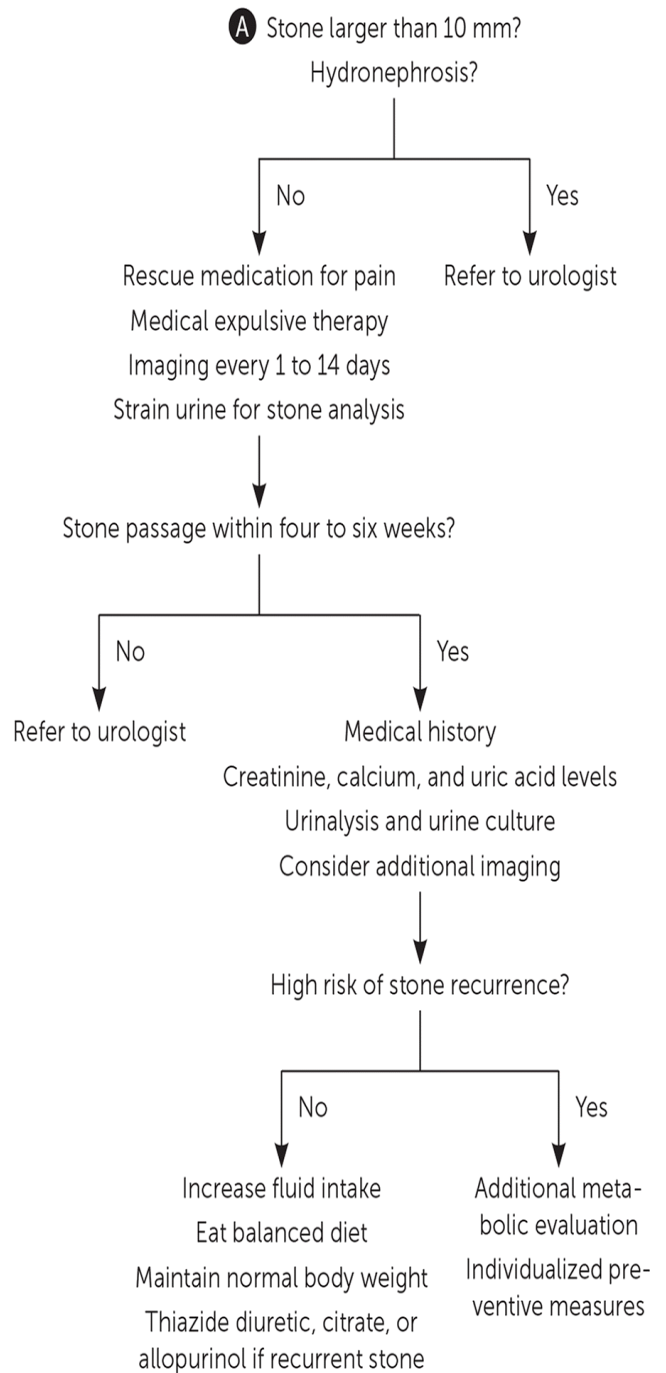
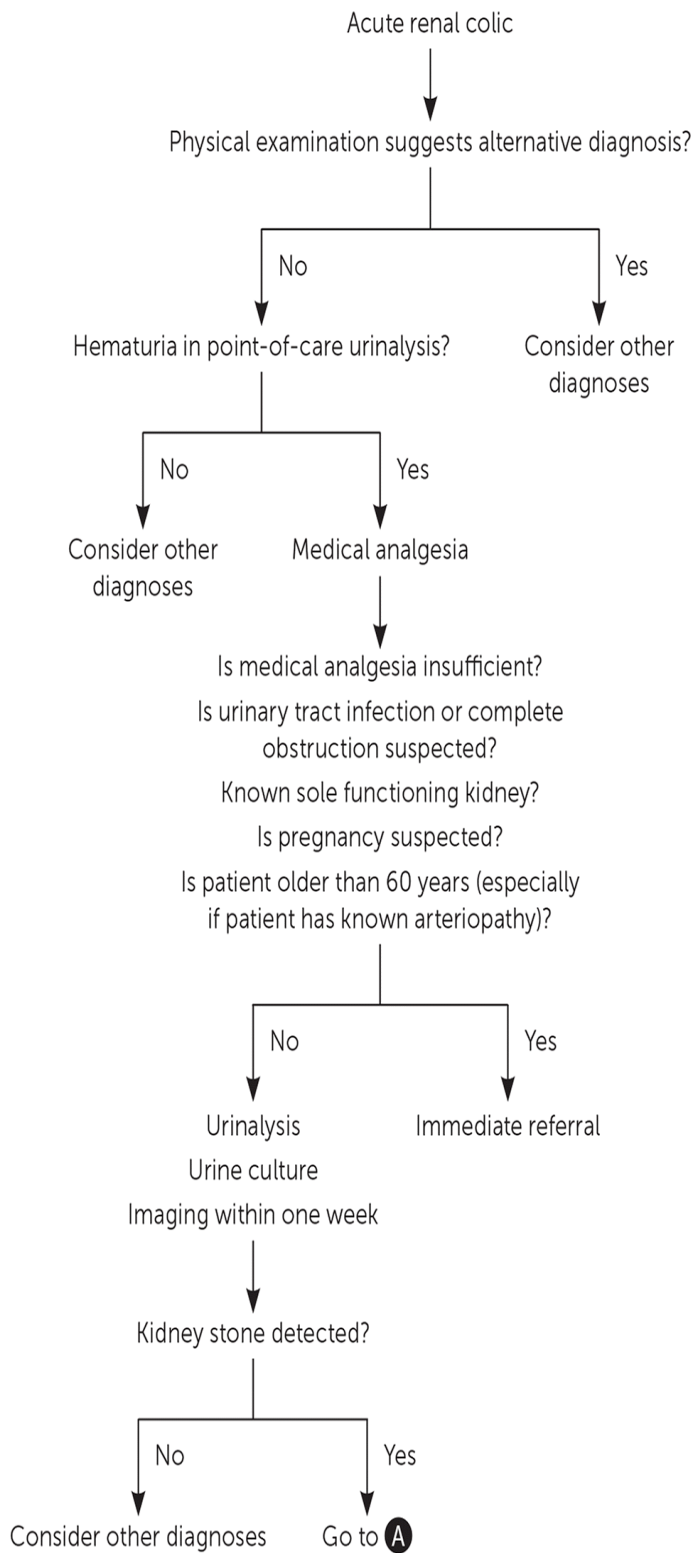


BLOOD IN
THE URINE

4.Treatment:

Most people with kidney stones are able to pass them on their own within 48 hours by drinking plenty of fluid. Pain medication can ease the discomfort. The smaller the stone, the more likely it is to pass without intervention, other factors that influence the ability to pass a stone include pregnancy ,prostate size, and patient size. Stone that are 9mm or larger usually do not pass on their own and require intervention, stones that are 5mm in size have a 20% chance of passing on their own while 80% of stones that are 4mm in size have a

chance of passing without treatment. Lithotripsy is a procedure that uses shock waves to break a kidney stone into smaller pieces that can be more easily expelled from the body. The device used for this procedure is called a Lithotripter. Kidney stones can also be removed surgically. A percutaneous nephrolithotomy is a procedure in which a kidney stone is removed via a small incision in the skin. A kidney stone may also be removed with a ureteroscope, an instrument that is advanced up through the urethra and bladder to the ureter.



5. Conclusion :

Citrate salts prevent new stone formation and reduce further stone growth in patient with residual stone that predominately contain oxalate. Citric is a byproduct of citric acid hence citric acid useful in solubility of kidney stone. Citric acid at a dose of 60mEq per day did not significantly alter urine composition in calcium phosphate stone formers. The long term impact of potassium citrate on calcium phosphate stone recurrence needs to be

studied further. We hope our blog guides you well on kidney stone types, symptoms, and treatments. So, if you are suffering form kidney stone symptoms or want to get the best advice from doctors, PSRI Hospital can help you. It is a famous multispeciality hospital in delhi with years of experience giving its patients the best possible treatments. So get excellent kidney transplant treatment from as and live a healthy life.

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