



Review Article

A Review on Kidney Stones & A Patient Satisfaction Survey of an Ayurvedic Brand to Treat Kidney Stones

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ABSTRACT

Objective: Kidney stones or nephrolithiasis, is a common problem worldwide. About 12% of the Indian population is estimated to have kidney stones and out of which 50% may end up with loss of kidney functions. In the first part of this article the pathophysiology of kidney stone, its types, risk factors, signs, symptoms, diagnosis and therapy have been discussed. Furthermore, various therapeutic approaches for kidney stone management are also briefly renewed. **Methods:** The second part of this article discusses a herbal formulation Ren-Cit® successfully used to treat kidney stone, its usage, composition as well as the actions of each of its medicinal constituents. A survey of patients who used Ren-Cit® has been conducted. **Finding:** The analysis of this survey revealed that 98% of the patients were suffering from kidney stone. Out of these 78% of the patients had hypertension and diabetes. None of the participants observed any side effects from the usage of Ren-Cit®. A total of 76% patients got relief from kidney stone by using Ren-Cit®. Various types of kidney stones diagnosed in these patients had varied composition, viz.; calcium oxalate stone (52%), calcium phosphate stone (16%), uric acid stone (12%), struvite stone (12%) and cystine stone (8%). **Novelty:** Ren-Cit® ayurvedic formulation proved to be effective on a wide range and types of kidney Stones.

Keywords: Kidney Stone; Urolithiasis; Calcium Oxalate; Uric Acid Stone; Calcium Phosphate; Ren-Cit®

INTRODUCTION

Kidney stones or nephrolithiasis or urolithiasis is a common problem worldwide. About 12% of the Indian population is estimated to have urinary stones and out of which 50% may end up with loss of kidney functions¹. According to a recent study by The National Health and Nutrition Examination Survey, a representative sample of the US population, men had in more propensity (10%) than women (2.857%) to develop kidney stone². Since, more than 5000 years ago people have employed natural plant products for a variety of purposes and incidentally, herbal therapy was the sole treatment option³. Herbal medicines are naturally occurring, plant-derived substances that are used to treat or prevent different diseases. For examples: Gokshura, Pashanbheda, Harmala, etc.

Mineral build-ups called kidney stones can be either free or connected to the renal papillae in the renal calyces and pelvis as in Figure 1⁴. In present lifestyle, kidney stones are becoming more and more common. Kidney stones are brought on by calcium oxalate and other substances found in urine and uric acid which can occasionally crystallize when they come together⁵. Identification of risk variables linked to disease development or severity may be possible with knowledge of the disease's epidemiology⁶. Kidney stone is a severe urinary tract illness and a widespread issue⁷. It is important to consider kidney stone disease as a systemic issue since it can cause cardiovascular damage, hypertension, insulin resistance, chronic kidney disease, and metabolic bone disease⁸. Due to extrinsic and endogenous variables that adversely affect the human body, urolithiasis has developed into endemic proportions in several geographical areas^{9,10}. Genetic influences involving

renal stones pathogenesis have also been identified¹¹.

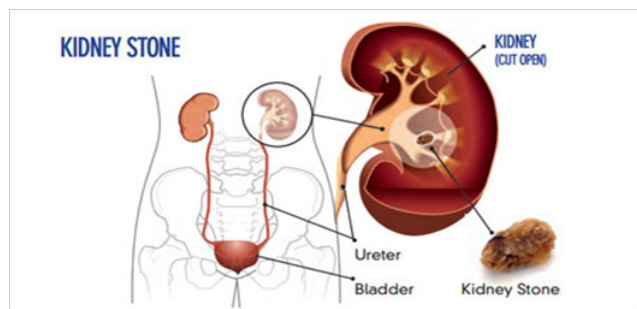


Fig. 1: Kidney Stone

Epidemiology of kidney stones can occur at any age; however, the peak incidence is reported in persons aged 20–49 years. Males are affected more than females¹². Hypercalciuria is encountered in approximately 60% of patients with kidney stones. It is pathogenetically important since it raises urinary calcium concentration and the saturation with respect to calcium oxalate and calcium phosphate. The rise in serum calcium caused by calcium absorption raises the amount of calcium that is filtered through the kidneys and inhibits parathyroid action. Renal hypercalciuria is a condition caused by an impaired renal tubular reabsorption. Absorptive and resorptive forms of hypercalciuria exist in primary hyperparathyroidism, which promote bone resorption of calcium and raise its levels in the blood and renal calcium load. An excess of PGE2 (phenyl glycidyl ether) may also be the cause of fasting hypercalciuria when accompanied by normal serum PTH. About 30% of patients with recurrent stone disease have hypocitraturia. Acid retention, often known as acidosis due to the elevated urine pH, also causes the production of uric acid stones. The production of uric acid stones brought on by excessive urine acidity may be exacerbated by hyperuricosuria in the presence of low urinary pH and calcium oxalate stones may occur when there is hyperuricosuria and a normal urine pH (>5.5). By raising the concentration of calcium oxalate in the urine, hyperoxaluria promotes the development of stones. Around 10% of patients with stones may have hypomagnesuria, which is likely to be brought on by insufficient magnesium consumption (Figure 2)¹³.

Pathophysiology

The process of calcium oxalate stone formation is depicted (Figure 3)¹⁴. An increase in calcium oxalate accompanied by a decrease in urine volume initiates urinary stone formation and urine saturation. Among these processes, the formation of Randall’s plaque is related to crystal nucleation and growth, while the formation of free particles is related to crystal aggregation and the formation of fixed particles is related to urothelial damage and through this process, stone retention is repeated and develops into urinary stone

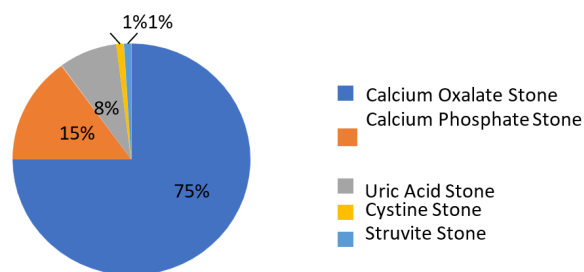


Fig. 2: Types of Kidney Stone

disease (USD). The urinary microbiome could be involved in stone formation through hyperoxaluria and calcium oxalate supersaturation, biofilm formation and aggregation, and urothelial injury¹⁵.

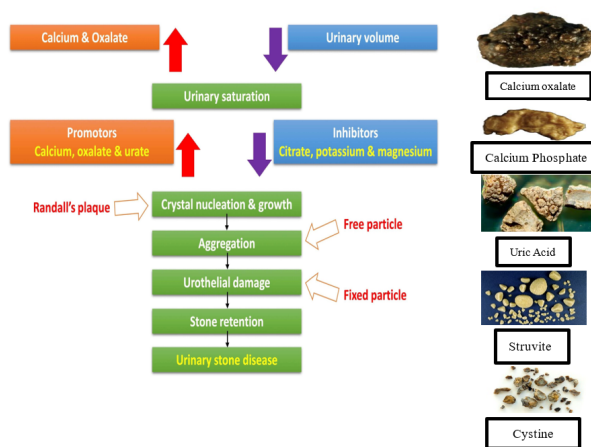


Fig. 3: Pathophysiology of Urinary Stone Formation

Sign and symptoms

The early stages of stone formation are symptomless. Later, indications and symptoms of the stone disease include renal colic (severe cramping pain), flank pain (a pain in the back), hematuria (bloody urine), obstructive uropathy (a urinary tract illness), urinary tract infections, obstruction of urine flow, and hydronephrosis. These illnesses may result in symptoms including nausea, vomiting, and others connected to the stone occurrence. As a result, the expenses ensued on healthcare cost as well as the lost productivity have a negative effect on the nation’s quality of life and economy^{3,16}.

Risk factors

Our diet plays the main role in the evolution and inhibition of kidney stones. Environment is another factor involved in kidney stone formation. Further, more our fluid intake amount, our body weight and genetic setup are also involved in it. Following factors are specifically involved,

- Hydrating routine or less intake of fluid.
- It is also a genetic disorder e.g.; Cysteine stone is caused by a genetic disorder called cystinuria.
- The occurrence is also increasing due to high intake of protein, fats, sugar, and sodium.
- Kidney stones can also develop by metabolic syndrome, obesity etc.
- Patients already having kidney stone and urinary tract infection (especially woman) easily develop struvite stones.
- The process of aging or increasing age is also a risk factor of kidney stone formation.
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- Glycosaminoglycans (GAG) concentration, citrates, pH, urine volume, CaOx crystals and urinary volume are other factors involved indirectly^{3,17}.

Diagnosis

A blood test can determine whether there is too much uric acid or calcium in the blood. Blood test results are used to determine the kidneys' state of health and to help doctors rule out other illnesses. The level of substances such as calcium, keratin etc. are also checked.

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- Urine testing

A 24-hour urine collection test is used to determine if the kidneys are excreting too many stone-forming minerals. For this test, the doctor advises collecting at least two urine samples over two days in a row. The chemicals found in urine are calcium, phosphate, uric acid, oxalate, and citrate, which is in high levels; prove to have kidney stones.

- Imaging

An imaging test may be used to determine whether kidney stones are present in the urinary tract. If small kidney stones cannot be detected by a simple abdomen X-ray, there are high-speed or dual energy computed tomography imaging test choices that can detect even the smallest stones computerized tomography (CT). Other imaging tools include X-rays, getting CT scans or injecting dye into an arm; which travels through the kidneys and bladder. Other, non-invasive tests include intravenous urography and ultrasound^{18,19}.

Therapeutic management of kidney stones

Non-surgical therapies

- **Fluid intake therapy:** Increasing fluid intake and lowering urine super saturation are two of the most effective ways to reduce kidney stones. Epidemiological and prospective intervention research has demonstrated the positive benefits of fluid intake²⁰.
- **Diuretic therapy:** Theoretically, due to the related raised hydrostatic pressure within the ureter, treatments that enhance renal fluid production, such as diuretics, may promote stone passage and elimination. Thiazide diuretics are the most efficient and well-tested diuretic medications, and they are successfully utilized for calcium stones. Example: Hydrochlorothiazide^{20,21}.
- **Expulsive therapy:** The expulsive method of treating kidney stones includes the use of medications to aid the naturally occurring transit of ureteral calculi. Calcium channel blockers (nifedipine), steroids (corticosteroids), non-steroidal anti-inflammatory medicines (NSAIDs) and α 1-adrenergic receptor antagonists are the medications that have been studied for the ejection of kidney stones. Steroids have been utilized to ease stone passage and lessen mucosal oedema^{20,22}.

Surgical therapies

- **Large stones:** While small stones removal can be achieved through appropriate medicine or increased fluid intake. Large kidney stones measure approximately 5 mm or larger, cannot be removed in same manner because they can stick in renal tube and can lead to kidney damage, internal bleeding, nephron loss, with increased risk of contracting certain urinary tract infections (UTI)^{23,24}.
- **Extracorporeal shock wave (Lithotripsy):** In this method, intense vibrations caused by shock waves or sound waves are used to shatter large kidney stones into smaller fragments as shown in Figure 4²⁵. The body's urine can easily expel the fragments of fractured stones, thereafter.
- **Nephrolithotomy:** Nephrolithotomy another best option if large stones removal. General anesthesia is given to the patient during this surgery. Its equipment is a thin telescopic instrument, used to remove kidney stones larger than 2 cm (about 0.79 in) that are particularly, near the pelvic region as in Figure 5²⁶.

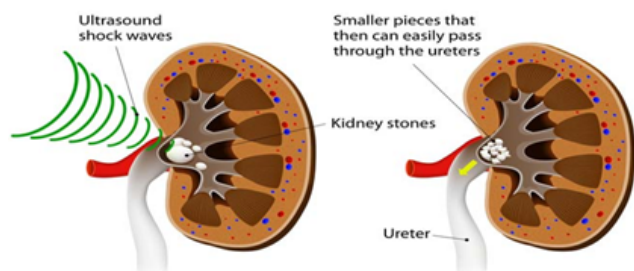


Fig. 4: Lithotripsy

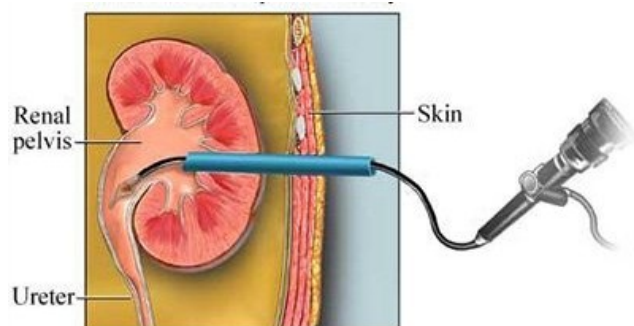


Fig. 5: Nephrolithotomy

- **Ureteroscopy:** Ureteroscopy is the procedure for removing stones which are stuck in the ureters or bladder. This procedure is painful and contains a small wire which connects with a camera at the end. The wire is inserted into the urethra and passed into the bladder for removal of stones with a cage connected with it as in Figure 6²⁷.

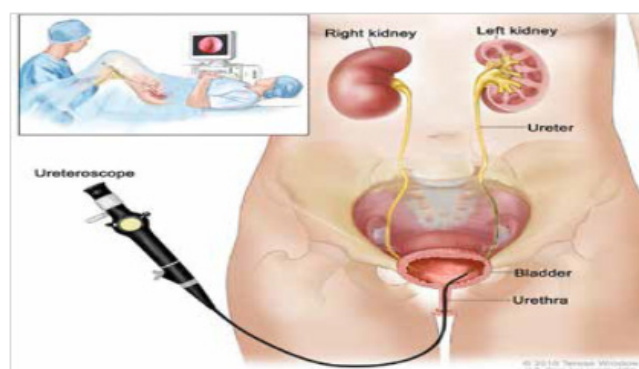


Fig. 6: Ureteroscopy

- **Ultrasonography:** Ultrasonography is a low-cost imaging modality without any ionizing radiation.

Images are obtained using ultrasonography when a transducer delivers short bursts of acoustic energy to the patient. This energy propagates through tissue as waves, partially reflecting to the source when passing between tissues of different densities or acoustic impedances. A receiver detects the reflected waves, enabling images to be generated based on wave travel times and amplitude. The standard gray scale image is referred to as B-mode or brightness mode ultrasonography in which the stones appear bright and sometimes with a dark distal shadow. In B-mode, harmonic mode can also be used in which the transmitted signal is of lower frequency than the received signal in an effort to improve resolution and decrease clutter. Color is sometimes displayed on the top of the image generated in B-mode (harmonic or not), which reflects the strength or frequency of doppler signal in doppler ultrasonography. The stones can be located in doppler ultrasonic graphic imaging that due to color in the image at the location of the stone as in Figure 7²⁸.

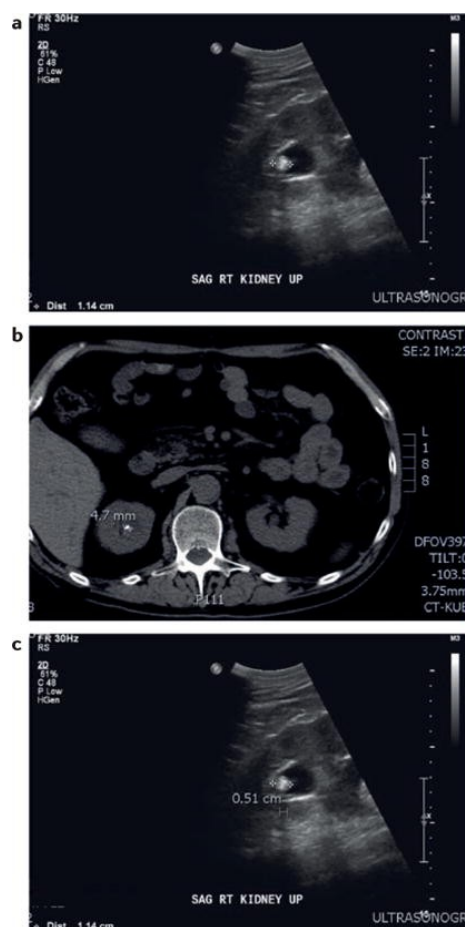


Fig. 7: Ultrasonography

- Herbal therapy:** Herbs and herbal medications are helpful in the treatment of kidney stones, because of their clinically validated benefits, like their immunomodulation, adaptogen, and antimutagenic properties. Due to the abuse of synthetic pharmaceuticals and increased frequency of adverse drug reactions, people are reverting to natural therapies. Many such, therapies, particularly, ayurvedic, have been established in recent years for urinary stone diseases²⁹.

INTRODUCTION TO ‘REN-CIT’®

‘Ren-Cit’® Citron life Science Pune is an Ayurvedic formulation which has pharmacological properties like antiurolithic activity, lithotriptic activity, diuretic activity and thus, it improves clinical manifestations due to kidney stones by reducing inflammation, pain, and general discomfort of the kidney and bladder, including expulsion of renal calculi of all forms and sizes without bladder irritation, if taken orally for three days, as one dose of syrup after dinner. The dosing pattern is depicted in Figure 8. This therapy includes a medication as shown in Table 1 in the form of syrup (3 bottles) and capsules (10 nos.).









Time	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
Evening	One 	One 	One 			
Morning		Two 	Two 	Two 	Two 	Two 

Fig. 8: Dose of the kit

MATERIALS AND METHODS

This is the post-treatment survey of ‘Ren-Cit’® of Citron life Science Pune is an Ayurvedic formulation. The data is based on the patient’s documents which included their visits for the medicine for urinary complaints and by diagnostic means were confirmed to have kidney stones. We collected the data by the survey of 50 kidney stone patients around the age group of 35-55 years by using specially designed goggle form. This Google form included a questionnaire as given in Table 2. Data is included related to patient gender, patient age, patient’s history with hypertension and diabetes. In the study pregnant women and children were excluded.

RESULTS

The results of the completed survey are given in the questionnaire format in (Table 3) as well as in Figures 9, 10, 11, 12, 13, 14, 15, 16 and 17.

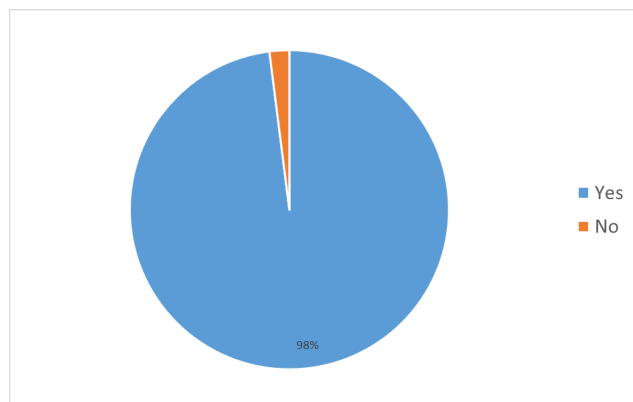


Fig. 9: Do you suffer from Kidney Stone? Yes 98% No 2%

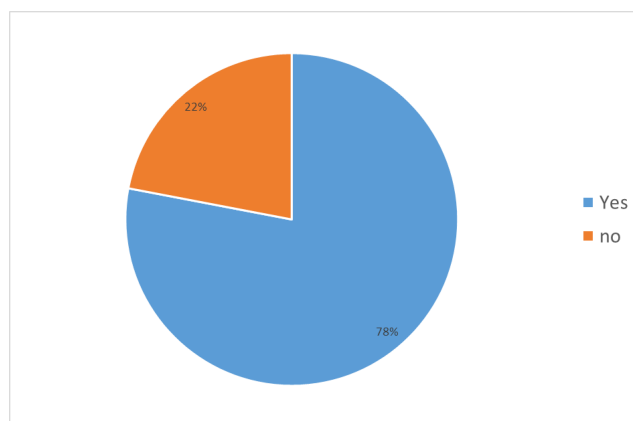


Fig. 10: Do you have history of Hypertension or Diabetes? Yes 78% No 22%

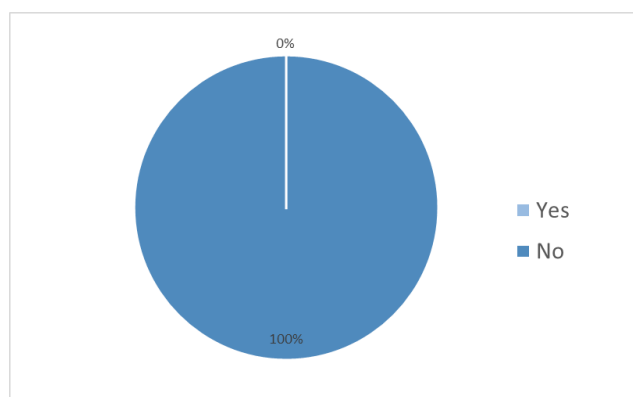


Fig. 11: Did you used Ren-cit? Yes 100% No Nil

Table 1: Composition of Herbal drugs used in 'Ren-Cit'®

Sr. no.	Common Name	Botanical Name	Mechanism of Action	Uses
	Gokshura	<i>Tribulus terrestris</i>	Increase in antioxidant enzyme activities along with decreased oxalate synthesizing biochemical parameters at higher doses ²³	Helps in healthy urine flow and also helps to control blood sugar level by removing toxins from the body.
	Pashanbheda	<i>Bergenia ligulata</i>	Acts on the kidney and is able to increase the volume of urine excretion ²⁴	Helps to breakdown Kidney stone.
	Harmala	<i>Peganum harmala</i>	It performs anti-inflammatory and immune modulatory effects via suppressing pro-inflammatory mediators such as prostaglandin E2, tumor necrosis factor alpha and nuclear factor-Kappa B ²⁵	Epilepsy, Psychosis, loss of memory, chronic headache, kidney stone, dropsy, jaundice, colic and sciatica.
	Varuna bark	<i>Crataeva nurvala</i>	Regulating the excretion of the metabolites and waste, metabolic errors and prevents the formation of stone ²⁶	Helps in dissolving renal calculi
	Parnabeej	<i>Bryophyllum pinna-tum</i>	Reducing the clinical features and size of stone, dissolving and expulsion of kidney stone as well as ureteric stone ²⁷	Helps in dissolving stones, conditions of urinary insufficiency, and inflammatory lesions.

Table 2: Survey Questionnaire (Google Form)**Questions**

- Do you suffer from Kidney Stone?
- Do you have history of Hypertension or Diabetes?
- Did you use 'Ren-Cit'®?
- Did you observe any side effects of 'Ren-Cit'®?
- Did you take any Allopathic medications on prior to 'Ren-Cit'®?
- Did you find any relief from Kidney Stone by using the 'Ren-Cit'®?
- Have you taken any other treatment for Kidney stone?
- What is the type of Kidney Stone you diagnosed with: i) Calcium Oxalate Stones ii) Calcium phosphate stones iii) Uric Acid Stones iv) Struvite Stones v) Cystine Stones
- Are you satisfied with the effects of 'Ren-Cit'®?

Table 3: Questionnaires

Questions	Patient Responses	
a. Do you suffer from Kidney Stone?	Yes- 98%	No-2%
b. Do you have history of Hypertension or Diabetes?	Yes- 78%	No-22%
c. Did you use 'Ren-Cit'®?	Yes-100%	
d. Did you observe any side effects of 'Ren-Cit'®?	No-100% Yes- Nil	
e. Did you take any Allopathic medications on prior to 'Ren-Cit'®?	Yes-78%	No- 22%
f. Did you find any relief from Kidney Stone by using the 'Ren-Cit'®?	Yes-76%	No-24%
g. Have you taken any other treatment for Kidney stone?	Yes-68%	No-32%
h. What is the type of Kidney Stone you diagnosed with: i) Calcium Oxalate Stones ii) Calcium phosphate stones iii) Uric Acid Stones iv) Struvite Stones v) Cystine Stones	a)52% b)16% c)12% d)12% e)8%	
i. Are you satisfied with the effects of 'Ren-Cit'®?	Yes- 90%	No- 10%

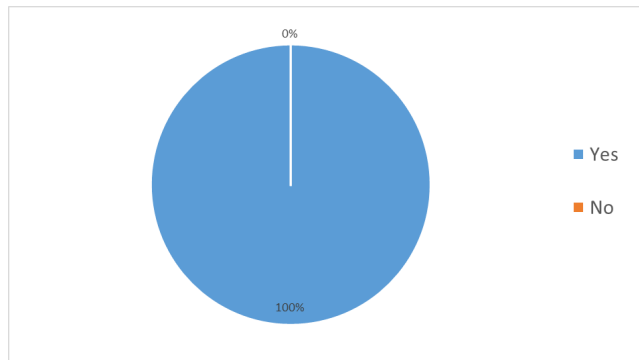


Fig. 12: Did you observe any side effects of Ren-cit? No 100% Yes Nil

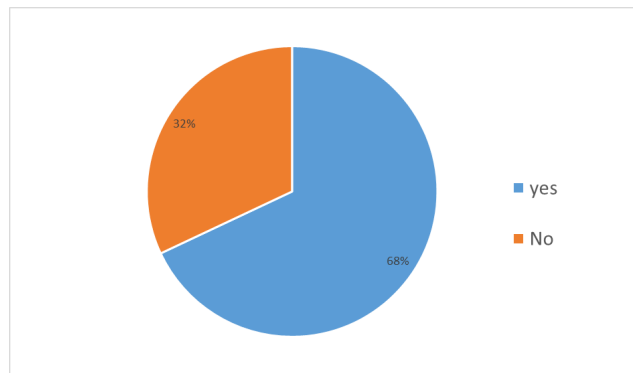


Fig. 15: Have you taken any other treatment for Kidney stone? Yes 68% No 32%

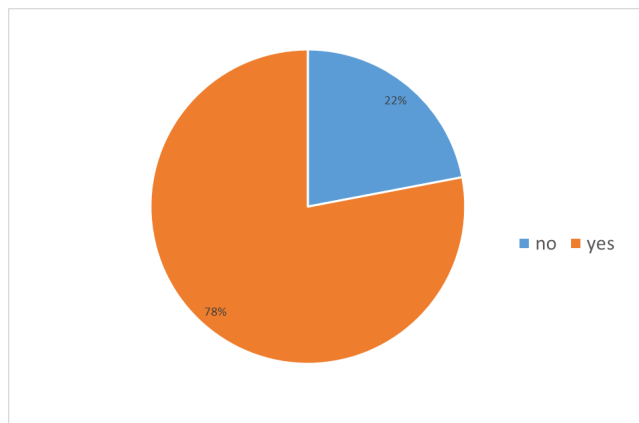


Fig. 13: Did you take any Allopathic medications on prior to 'Ren-Cit'?? No 22% Yes 78%

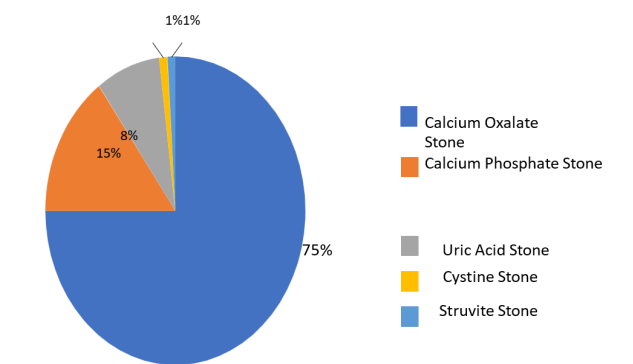


Fig. 16: What type of Stone you diagnose with?

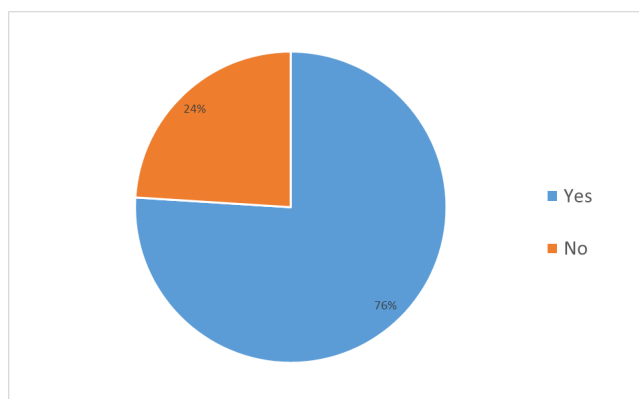


Fig. 14: Did you find any relief from Kidney Stone by using the Ren-cit? Yes 76% No 24%

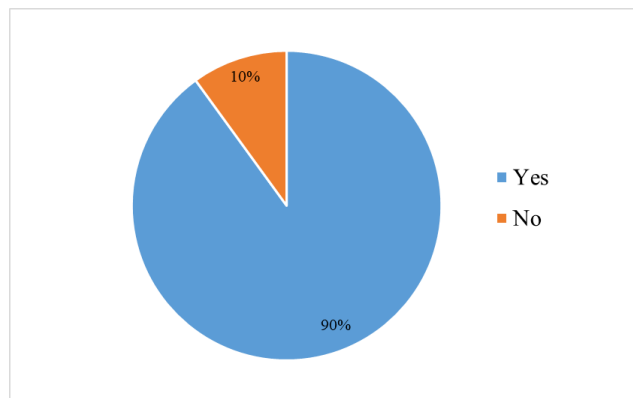


Fig. 17: Are you satisfied with the effects of 'Ren-Cit'? Yes- 90% No- 10%

DISCUSSION

With regard to those who are interested in natural components, the pharmacy business has achieved a high level of success in natural products that people enjoy using. We focused on the survey of the use of a herbal Lithotriptic 'Ren-Cit'® formulation in the present study. The analysis of this survey is post-treatment which revealed that 98% of the patients were suffering from kidney stone. Out of these 78% of the patients had hypertension and diabetes. None of the participants observed any side effects from the usage of Ren-Cit.® A total of 76% patients got relief from kidney stone by using Ren-Cit.® Various types of kidney stones diagnosed in these patients had varied composition, viz.; calcium oxalate stone (52%), calcium phosphate stone (16%), uric acid stone (12%), struvite stone (12%) and cystine stone (8%)¹⁹. Males were clearly more affected than females. The findings show that the prevalence of kidney stones is directly proportional to dietary intake, systemic illness, and hereditary factor. Most responses were from the age range between 35-55 years. Any of the respondents did not observe any type of side effects of 'Ren-Cit'®.

CONCLUSION

Kidney stone incidences are rising globally despite significant advancements in the creation of novel medicines for the management of urinary stones. Renal stone development is still poorly understood in many ways. However, it is evident that kidney stone formation is significantly influenced by renal cell damage, crystal retention, and cell apoptosis. Thus, Ren-Cit® proved to be effective on a wide range and types of kidney stones.

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