"**A comprehensive survey on kidney stone and Evaluating the Efficacy of Novel Pharmacological Agents in Kidney Stone Management"**

Project

Survey on A comprehensive survey on kidney stone and Evaluating the Efficacy of Novel Pharmacological Agents in Kidney Stone Management

Submitted To

The Department of Pharmacy,

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In the partial fulfillment of the requirements for the degree of Bachelor of Pharmacy

Submitted By

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APPROVAL

This project Survey on A comprehensive survey on kidney stone and Evaluating the Efficacy of Novel Pharmacological Agents in Kidney Stone Management, submitted to the Department of Pharmacy, Faculty of Health & Life Sciences, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of Bachelor of Pharmacy and approved as to its style and contents.

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DECLARATION

Firstly, I'd like to express my heartfelt gratitude to Allah, the All-Powerful, for providing me with the ability to complete my project work and the opportunity to focus on this topic, Alhamdulillah. I'm also grateful to my honorable project supervisor, **Mr. Anwar Parvez,** Lecturer, Faculty of Health & Life Sciences, Daffodil International University, for his brilliant guidance and steady supervision, as well as for providing critical information about the challenge and his assistance in completing it. I would like to express my humble regards to **Dr. Muniruddin Ahmed**, Professor and Head, Department of Pharmacy, Daffodil International University. I wish to offer my respect to all of the teachers of Pharmacy Department, Daffodil International University and thankful to other members for their excellent cooperation, support and motivation in helping me to complete this project.

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ABSTRACT

Kidney stones have been increasingly prevalent in young individuals during the last 22 years. The development of stones in children may happen at any age, including in premature neonates. When minerals and other substances found in urine crystallize into a solid mass in the urinary system, kidney stones are formed. They may also occur as a result of insufficient amounts of other substances in the urine that prevent stone formation. This study used a physical method to learn about the current condition of kidney patients and how to effectively care for them. The majority of kidney stone patients, according to the poll's findings, suffered symptoms for one to three years. Kidney stones have been reported in about 81% of people. Despite the fact that kidney stones impact a significant section of the population, 19% of people are not affected. The results of this inquiry will be useful for related research.

Keywords: Kidney, Iron, Vitamin, Percutaneous nephrolithotomy, Fatigue.

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Introduction

1.1. Kidney

The kidneys are a pair of bean-shaped organs in vertebrates that are rusty brown. They are approximately 12 centimeters (approximately 4 and 1 1/2 inches) in length and are situated on either the left or right side of the retroperitoneal region in an adult [1]. The kidneys receive their blood supply from the paired renal arteries, and the blood is expelled from the kidneys through the paired renal veins. The ureter, a conduit that facilitates the transportation of urine from the body to the bladder, is connected to each kidney. The kidney regulates the body's fluid volume, osmolality, acid-base balance, concentrations of various electrolytes, and the elimination of pernicious substances. The glomerulus filters approximately one-fifth of the blood volume that passes through the kidneys. Water that is devoid of solutes, amino acids, glucose, bicarbonate, and salt are components that may be reabsorbed. Ammonium, potassium, hydrogen, and uric acid are among the compounds that may be released by the nephron, which is the anatomical and functional component of the kidney [2].

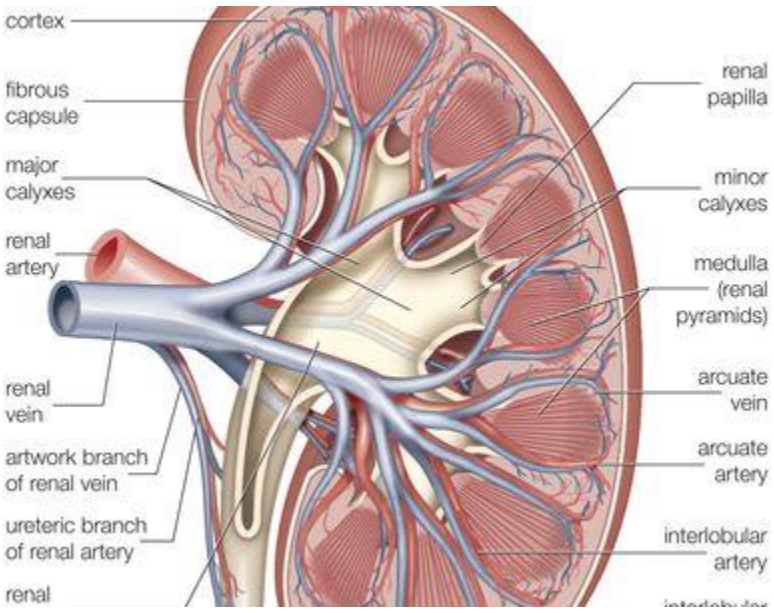

Fig 01: Kidney.

Even though a mature human kidney contains over one million nephrons, the kidney of a rodent contains only approximately 12,500 of these structures. The kidneys are responsible for a multitude of functions that are not explicitly linked to the nephrons. The kidneys play a crucial role in converting a vitamin D precursor into its active form, calcitriol, and are responsible for producing the hormones erythropoietin and renin. Chronic kidney disease (CKD) has become a significant global public health concern, with an estimated prevalence of 13.4%. The number of individuals with kidney failure requiring renal replacement therapy is projected to be between 5 to 7 million worldwide [3]. Managing kidney disease involves various diagnostic procedures, including urinalysis (a chemical and microscopic examination of urine), estimation of kidney function through the calculation of the estimated glomerular filtration rate (eGFR) based on serum creatinine levels, kidney biopsy, and CT scans to identify abnormal anatomy. There are two treatment options for renal failure: kidney transplantation and dialysis. It is almost certain that one of these options (or both consecutively) will be implemented when the patient's renal function is less than 15%. Patients with renal cell malignancy frequently endure nephrectomy as a treatment measure. The scientific investigation of the kidneys' operation is known as renal physiology.

Nephrology is a medical specialty focusing on conditions that impede renal function. Nephrotic and nephritic syndromes, acute renal injury, chronic kidney disease (CKD), and pyelonephritis are among the conditions that are included in this category. Urology is a medical specialty that specializes in treating conditions affecting the structure of the kidneys and urinary system. Cancer, renal cysts, kidney stones, ureteral stones, and urinary tract blockage are among the conditions that are included in this category [4]. The adjective "renal" has its origins in either French or late Latin. It is "associated with the kidneys." There are individuals who advocate for the substitution of the term "renal" with "kidney" in scientific publications, such as "kidney artery." However, certain specialists have argued for the continued use of the term "renal" in situations where it is appropriate, such as in the phrase "renal artery" [5].

1.2. Structure

Kidneys are located in the higher abdominal area of humans, retroperitoneally at an oblique angle, one on either side of the spine. This configuration facilitates the optimal operation of renal function [6]. The right kidney is generally smaller and marginally lower than the left one. This is due to the liver's position in a more central location within the abdominal cavity [7-9]. The left kidney's level is approximately equivalent to that of T12–L3.

Nevertheless, the right kidney's level is marginally lower [10]. The right kidney of an individual is located immediately beneath the diaphragm and the liver. It is also known as the right renal artery. The left kidney is located in its natural position beneath the spleen and the diaphragm. An adrenal gland is located at the apex of each kidney. The 11th and 12th ribcages in the body partially shield the upper regions of the kidneys. Each kidney and adrenal gland are surrounded by two distinct forms of fat: perirenal fat, which is located between the renal fascia and renal capsule, and pararenal fat, which is located above the renal fascia. Both of these forms of fat are included in perirenal fat. The kidneys of a human organism are bean-shaped, with a convex upper border and a concave bottom border. In addition to eliminating waste products from the body, they also filter blood [11].

The renal hilum is a depressed region that is located on the concave margin. This is the point at which the renal artery enters the kidney and the renal vein and ureter exit. The kidney is encased in three additional layers of fat: the perirenal fat, renal fascia, and pararenal fat, in addition to the renal fascia, perirenal fat, and renal capsule [12-13]. The posterior of these tissues is covered by the transversal fascia, while the front is covered by the peritoneum. The upper pole of the right kidney is situated in close proximity to the organ to its left in humans. The spleen, a metabolic organ, may be situated in close proximity to the kidney, which is situated on the left side of the body. Inhalation will cause both of these values to decrease. The left kidney of an adult is typically 11.2 centimeters (4+7/16 in) in length, while the right kidney is 10.9 centimeters (4+5/16 in) in size. The median renal volumes of the left kidney were 146 cm3 (8+1516 cu in), while the right kidney was 134 cm3 (8+316 cu in) [14].

Structural Anatomy

The renal medulla and renal cortex are the two primary components of the kidney's functional substance or parenchyma. The kidneys are generally divided into eight to eighteen cone-shaped renal lobes, each containing a renal cortex that encircles a portion of the medulla known as a renal pyramid. The renal pyramids contain fifteen renal columns, which are cortical projections. The medulla and cortex are the sites of distribution for the nephrons of the kidney, which are responsible for the excretion of waste products [15]. The renal corpuscle, situated in the nephron's cortical layer, is responsible for the initial filtration. A renal tubule subsequently migrates from the cortex to the medullary pyramids. The renal cortex is composed of a single collecting duct and a collection of tubules in the kidney known as a medullary ray. Each pyramid, or papilla, has an apex that discharges urine into a minor calyx. This calyx then empties into a major calyx, which empties into the renal pelvis. The ureter will develop from this point. The renal artery enters the kidney at the hilum, where the ureter and renal vein emerge. These structures are enveloped by the hilar adipose and lymphatic tissue, which contain lymph nodes. The renal sinus, which is also extensively populated with fat, is connected to the hilar fat. The renal sinus, which also differentiates the renal pelvis and calyces from the renal medullary tissue, contains both structures [16].

Blood supply

The renal arteries supply the kidneys with blood, which are directly derived from the abdominal aorta. These arteries may be situated on either side of the kidney. In an adult, the kidneys receive approximately 20–25% of the cardiac outflow [17]. The renal arteries are further subdivided into segmental and interlobar arteries, which extend through the renal columns between the renal pyramids and penetrate the renal capsule. The arcuate arteries, located along the boundary between the cortex and the medulla, are subsequently supplied with blood by the interlobar arteries. Each arcuate artery supplies a multitude of interlobular arteries, which feed into the afferent arterioles, which are responsible for providing the glomeruli. Blood that has been evacuated from the kidneys ultimately finds its way to the inferior vena cava. The blood is transported through a highly compact network of venules, which subsequently cluster to form interlobular veins after filtration. The distribution of blood through the veins is similar to that of the arterioles: blood travels from

the interlobular veins to the arcuate veins and then back to the interlobar veins. In the end, the renal veins merge to create the veins that escape the kidney [18].

Nerve supply

The renal plexus facilitates communication between the nervous system and the kidneys, which trails the renal arteries to each kidney. Sympathetic nervous system induces vasoconstriction in the kidneys, which subsequently decreases the volume of blood that passes through the kidneys. In addition to information from the sympathetic nervous system, the kidney receives input from the parasympathetic nervous system through the renal branches of the vagus nerve. The function of this input has yet to be fully understood. The dermatome that corresponds to the kidney receives the sensory information after it is transmitted from the kidney to the T10-11 spinal cord levels. As a result, the kidney that corresponds to the abdominal area may be the source of the discomfort [19].

Microanatomy

Renal histology is the examination of the kidney through microscopic means. The following are examples of a variety of cell types:

- The distal tubule cell of the kidney

- The principal cell of the collecting duct

- The intercalated cell in the collecting duct

- The cells in the renal interstitium

1.3. Function

The kidneys' discharge of urine is responsible for the elimination of a wide range of waste products that are produced during metabolism. Nephrons are the structural and functional building blocks of renal tissue at the microscopic level. Urine results from the filtration, reabsorption, secretion, and excretion processes conducted on the blood supply to the kidney. Nitrogenous metabolites,

such as urea and uric acid, are produced during the degradation of proteins and nucleic acids, respectively [20]. Certain animals and mammals must endure a complex countercurrent multiplication process to concentrate wastes into a volume of urine substantially less than the volume of blood from which the wastes were removed. This capacity enables the mammal or organism to eliminate a significantly reduced amount of defecation. In order to function efficiently, the nephron must possess the following attributes: a compact helical structure of the tubules, water and ion permeability in the descending limb of the loop, water impermeability in the ascending loop, and active ion transport out of the majority of the ascending limb.

Additionally, in order to facilitate this function, the blood arteries of the nephron must engage in passive countercurrent exchange with one another. The kidney is a critical organ in maintaining homeostasis throughout the body, as it regulates electrolyte concentrations, extracellular fluid volume, blood pressure, and acid-base balance.[21-22] These homeostatic functions are executed by the kidney both independently and in collaboration with numerous other organs, particularly those that are part of the endocrine system. These endocrine processes are coordinated by a diverse array of hormones the endocrine system produces. Renin, angiotensin II, aldosterone, antidiuretic hormone, and atrial natriuretic peptide are among the hormones that contribute to this category [23].

Urine formation

Filtration

he renal corpuscle is the location of filtration, which is responsible for preserving large proteins and cells [24]. An ultrafiltrate is generated from the bloodstream by filtration of elements with reduced molecular weights, subsequently transforming into urine. The human kidneys produce approximately 180 liters of filtrate daily [25]. The urine volume collected over 24 hours typically falls within 800 to 2,000 milliliters per day [26]. The technique is also known as hydrostatic filtration, resulting from the hydrostatic pressure acting on the capillary walls.

Reabsorption

The reabsorption process involves the transfer of molecules from the ultrafiltrate to the peritubular capillary. In this situation, the receptors on the luminal cell membrane are essential. Approximately

55% of the water that enters the proximal tubule is reabsorbed. To sustain normal blood glucose levels, the proximal tubule must consume the entire glucose concentration in the circulation. The Na+/glucose cotransporter is the foundation of this mechanism. Upon reaching a plasma level of 350 mg/dL, the transporters will be entirely saturated, and any subsequent glucose will be excreted in the urine. Glucosuria is a critical clinical indicator of diabetes mellitus and may be present at a plasma glucose level of approximately 160. Sodium-dependent amino acid transporters in the proximal tubule facilitate amino acid reabsorption. Pellagra is a symptom of Hartung's illness, which is caused by a deficiency of the tryptophan amino acid transporter [27].

Secretion

Secretion is the process by which molecules are transported from the peritubular capillary through the interstitial fluid, the renal tubular cell, and ultimately into the ultrafiltrate. It is the opposite of reabsorption.

Complete eradication

Transporting molecules from the peritubular capillary to the ultrafiltrate involves secretion, which begins in the interstitial fluid and continues through the renal tubular cell. This process is in contrast to reabsorption.

Complete eradication

Ultimately, the ultrafiltrate is eliminated; it departs the nephron and travels through the collecting duct and the remaining collecting duct system to the ureters, where it is converted to urine. The collecting duct, which serves a dual function, transports the ultrafiltrate and facilitates reabsorption.

Hormone secretion

Renin, calcitriol, and erythropoietin are hormones synthesized by the kidneys. Erythropoietin is secreted into the renal circulation as a result of hypoxia, which is defined by insufficient tissue-level oxygen. Subsequently, erythropoiesis, which involves the production of red blood cells in the bone marrow, is initiated. The active form of vitamin D, calcitriol, enhances the reabsorption

of calcium and phosphate in the kidneys and intestinal tract, respectively. Renin regulates angiotensin and aldosterone concentrations.

Blood pressure regulation

Despite its inability to actively perform this function, the kidney is crucial for the long-term preservation of optimal blood pressure levels. The primary mechanism by which this occurs is the maintenance of the extracellular fluid compartment, the extent of which is determined by the plasma sodium concentration. Renin is the initial component of a sequence of critical chemical mediators essential for the renin-angiotensin system. The primary products of this system are angiotensin II and aldosterone, and the resulting changes result from alterations in renin. Each hormone increases the kidney's ability to absorb sodium chloride, increasing the size of the extracellular fluid compartment and resulting in blood pressure. Even though each hormone has its unique set of effects, they have the same cumulative effect. As renin levels increase, the concentrations of angiotensin II and aldosterone increase, leading to an increase in blood pressure, the expansion of the extracellular fluid compartment, and an increase in sodium chloride reabsorption. Conversely, a decrease in the production of angiotensin II and aldosterone results from reduced renin levels, which constrict the extracellular fluid compartment and decrease blood pressure.

Acid-base equilibrium

The kidneys and lungs regulate the body's acid-base balance. The body's pH is maintained at approximately 7.4 through acid-base homeostasis. The lungs, which are responsible for modulating blood carbon dioxide (CO2) levels to maintain acid-base equilibrium, substantially impact the respiratory system. The respiratory system is the body's initial defense against an acid-base imbalance. It regulates respiration to restore the body's pH to a healthy 7.4 range. The respiratory rate increases in response to acidosis, which reduces the H+ content and removes CO2 from the blood, contributing to the rise in blood pH. The body's respiration rate decreases under fundamental conditions, leading to additional carbon dioxide retention. This, in turn, results in a decrease in pH and an increase in H+ concentration. The regulation of acid-base balance is a function of two kidney cells, intercalated A and B cells. When the pH of the body's internal environment grows more acidic, the intercalated A cells become active. The HCO3 + H --> H2CO3

--> $CO_2 + H_2O$ equilibrium is shifted to the left under acidic conditions, allowing CO_2 to penetrate the cell. This is a consequence of the elevated CO_2 concentration in the blood. An H^+ pump and an H^+/K^+ exchanger are located on the luminal side of the cell.

To circulate H^+ against the gradient, they necessitate ATP. These cells are responsible for extracting H^+ and transporting it to the filtrate, which may lead to an increase in the pH of the blood. Diffusion is facilitated by the presence of Cl/K cotransporters and HCO_3/Cl exchangers on the basolateral side of the cell. The HCO_3 concentration in the cell increases as the reaction is shifted to the left, and HCO_3 can subsequently migrate out into the circulation, thereby elevating the pH. The HCO_3/Cl exchanger and the K/Cl cotransporter are situated on the luminal side of the intercalated B cell. In contrast, proton pumps are located on the basolateral side, analogous to intercalated A cells. They continue to perform their original function but now reduce blood pH by releasing protons between the two.

Regulation of osmolality

The kidneys regulate the body's sodium and water levels. In the event of a significant increase in plasma osmolality, the hypothalamus notifies the posterior pituitary organ. In response to an increase in osmolality, the pituitary gland releases antidiuretic hormone (ADH), which compels the kidney to reabsorb water. The combined effects of the two variables restore plasma osmolality to its normal state.

Measurement of function

Kidney function is evaluated using a diverse array of methodologies and formulas. The quantity of plasma in which a chemical is eliminated from the circulation within a specified time frame is referred to as renal clearance. The filtration fraction is the proportion of plasma efficiently filtered by the kidneys. The equation can be used to describe this. Mathematical modeling has been implemented to thoroughly comprehend kidney function in various dimensions, such as fluid absorption and secretion [28-29].

1.4. Kidney stone disease

Crystallography is the medical term for a condition in which a solid fragment of material (a kidney stone) develops in the urinary system. This condition, also known as nephrolithiasis or urolithiasis, is more commonly referred to as kidney stone disease [30]. Kidney stones are typically formed in the kidney and eliminated from the body via the urinary tract. It is possible for a minute stone to travel through the body without causing any symptoms. The ureter may become obstructed, resulting in excruciating and penetrating pain in the lower back or abdomen if a stone grows to a size of 5 millimeters (0.2 inches). [31-32] Vertigo, excruciating urination, and blood in the urine are additional symptoms that may be linked to the presence of a stone. Within the next decade, approximately fifty percent of individuals who have previously expelled a kidney stone will do so again—a combination of genetic predisposition and environmental factors results in the formation of the preponderance of rocks.

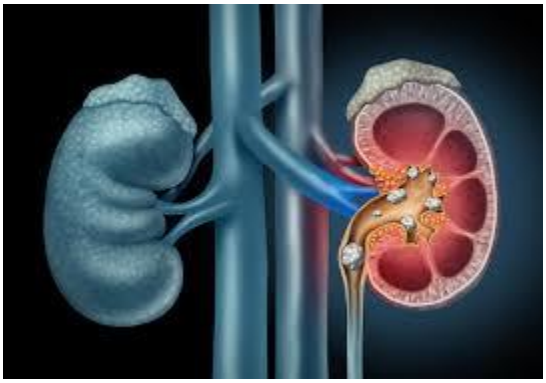

Fig 02: Kidney stone.

Various risk factors, including hyperparathyroidism, gout, obesity, specific meals, specific medications, calcium supplements, and high levels of urinary calcium, influence the development of gout. Kidney stones develop when the concentration of minerals in the urine is elevated [33]. The patient's symptoms, the results of urinary tests, and medical imaging are the primary factors that determine the diagnosis. This situation may also benefit from blood testing. Stones are

generally categorized according to their location, such as nephrolithiasis (kidney), ureterolithiasis (ureter), or cystolithiasis (bladder), or the chemical composition of the stone (calcium oxalate, uric acid, struvite, cystine). To prevent kidney stones in individuals who have previously experienced this condition, it is adequate to ingest a quantity of water that produces more than two liters of urine every day [34]. If this is ineffective, consider taking a thiazide diuretic, citrate, or allopurinol. It is strongly recommended that individuals avoid consuming soft beverages that contain phosphoric acid, a substance that is commonly found in colas. Therapy is not required if a stone does not produce any symptoms.

Nevertheless, the initial phase of treatment typically involves the management of pain through the use of medications such as analgesics or nonsteroidal anti-inflammatory drugs if a stone does induce symptoms [35].

Tamsulosin, a medication, can facilitate the passage of larger stones. However, in certain situations, it may be necessary to perform additional medical interventions, such as extracorporeal shock wave lithotripsy, ureteroscopy, or percutaneous nephrolithotomy. At some point in their lifetimes, one percent to fifteen percent of the global population is affected by kidney stones [36]. In 2015, approximately 16,100 fatalities were reported, with 22.1 million cases. Since the 1970s, they have assimilated increasingly into the Western cultural mainstream [37]. Men are more susceptible to the consequences than women in most cases. Surgical procedures to remove kidney stones have been a concern for humans throughout recorded history, with written accounts dating back to at least 600 BC [38].

1.5.1. History Kidney stone

One example is Joseph Glanville's Saducismus Triumphatus, which describes in detail how Abraham Mechelburg was accused of practicing witchcraft because he voided tiny stones via his penis' virga. The first records of kidney stones date back thousands of years [39]. The dating of a stone discovered in the pelvis of a long-dead Egyptian was set at 4,800 B.C. in 1901. Early medical texts from Mesopotamia, India, China, Persia, Greece, and Rome all made reference to calculous

disease. One reading of the Hippocratic Oath states that ancient Greek doctors were required to defer to operating surgeons when removing stones surgically (lithotomies). In his Roman medical treatise De Medicina, author Aulus Cornelius Celsus [40] explains the lithotomy operation. Based on this effort, this business was established until the 18th century. Renowned personalities like Isaac Newton, Benjamin Franklin, Michel de Montaigne, Lyndon B. Johnson, Herman Boerhaave, Antonio Scarpa, Francis Bacon, Peter the Great, Napoleon I, Epicurus, Napoleon III, Peter the Great, Louis XIV, George IV, Oliver Cromwell, Lyndon B. Johnson, Benjamin Franklin, and many more have experienced kidney stone disease. Notable victims also include Herman Boerhaave, Antonio Scarpa, and Boerhaave herself [41]. In 1520, new lithotomy procedures were established, despite the procedure's continued danger status. In 1878, Henry Jacob Bigelow popularized the litholapaxy procedure, which reduced the total mortality rate from around 24% to 2.4%. Despite the implementation of several treatment techniques, a considerable mortality rate remained, especially among urologists with enough clinical experience [42]. One of the first companies to commercialize extracorporeal shock wave lithotripsy was Dornier MedTech in 1980. The use of auditory pulses to break stones has led to this method's subsequent broad adoption [43].

1.5.2. Signs and symptoms

Kidney stones typically do not cause significant distress until they migrate within the kidney or penetrate one of the ureters. The kidneys and bladders are connected by ureters, which are the passages. If kidney stones become lodged in the ureters and impede the normal flow of urine, they can cause substantial distress. This may lead to the ureters experiencing spasms and the kidney in question experiencing a significant increase in size [44]. Consequently, one or more of the subsequent symptoms may be observed:

- A sharp, stabbing pain in the lower back and side.
- A slight sensation of discomfort in the pelvic region and lower abdomen
- It is impossible to anticipate the onset or duration of the pain.
- Urinary symptoms include itching, itching, or searing sensations.

- There are the following potential additional symptoms:
- The color of urine may range from pink to red to brown.
- Urine that is turbid or odorous is considered of inferior quality.
- An insatiable desire to eliminate, an increase in the frequency of urination, or an insufficient or irregular discharge.
- An uncontrollable, insatiable urge to urinate
- Fever and chills are signs of an infection.

As a kidney stone passes through the urinary system, the patient may experience a range of discomfort, including distress in terms of intensity and location [45-46].

1.5.3. Causes

Nevertheless, numerous factors can increase the likelihood of developing kidney stones; they are not typically caused by a single, identifiable factor. Kidney stones are formed when the concentration of crystal-forming chemicals in the urine surpasses the fluid's ability to dilute them, such as calcium, Oxalate, and uric acid. In the interim, your urine may be deficient in compounds that prevent crystals from adhering, fostering an optimal environment for developing kidney stones [47].

Fig 03: Food high in Oxalate.

1.5.4. Kidney stone subtypes

Your diagnosis determines the options for treating your specific type of kidney stone and the methods for reducing the likelihood of developing additional kidney stones. Preserving a kidney stone if your physician requires it for examination is crucial [48-49].

Calcium bones are among the numerous forms of renal stones. Most renal stones are calcium oxalate, which is either produced by the organism or assimilated from the diet daily. In addition to specific vegetables, almonds, and chocolate are rich in Oxalate.

Various metabolic diseases, intestinal bypass surgery, excessive vitamin D intake, and dietary variables can elevate the quantity of calcium or Oxalate in urine.

• Calcium phosphate may be the root of calcium stones. These stones are more likely to develop in patients with renal tubular acidosis and other metabolic disorders. This phenomenon may be linked to topiramate, a medication that is prescribed to alleviate both migraines and seizures (Topamax, Trokendi XR, Qudexy XR).

Struvite-containing rocks. Struvite stones may develop as a consequence of a urinary tract infection. Despite the absence of any symptoms or early warning signs, the stone has occasionally grown to an immense size.

k Crystals of uric acid. Individuals who have diabetes, have metabolic syndrome, consume a high-protein diet, or suffer from chronic gastroenteritis or malabsorption are at an increased risk of developing uric acid stones. The probability of developing uric acid stones is elevated if you have a family history of the condition.

- Cystine-containing stones. Individuals with cystinuria, a genetic condition that results in the kidneys excreting an excessive amount of a particular amino acid, are at an elevated risk of developing these stones.

1.5.5. Risk factors

Among the factors that may contribute to the formation of kidney stones is the past of one's individual or family. The probability of developing kidney stones is elevated when a close relative has already encountered them. You are at an increased risk of developing another kidney stone after you have already experienced one.

Hydrations

Kidney stones are more likely to develop in individuals who do not ingest sufficient fluids daily. Individuals who sweat or live in humid, arid regions may be at an elevated risk.

Certain regimens

Specific forms of kidney stones may develop more frequently in individuals who consume an excessive amount of protein, sodium (salt), and sugar. Excessively sodium-rich diets emphasize this concept. A high sodium intake is directly correlated with the development of kidney stones, as the kidneys are compelled to filter a larger quantity of calcium from the blood.

Obesity

An increased risk of developing renal stones has been associated with a high body mass index (BMI), a large abdominal circumference, and accelerated weight gain.

Surgery and conditions that affect the digestive system

Suppose you have experienced persistent diarrhea, inflammatory bowel disease, or gastric bypass surgery. In that case, these conditions may affect your digestive process and elevate the concentration of compounds in your urine that have the potential to crystallize into stones.

Individuals with renal tubular acidosis, cystinuria, hyperparathyroidism, or recurrent urinary tract infections may be at an increased risk of developing kidney stones.

An increased risk of kidney stones has been linked to the use of vitamin C, nutritional supplements, laxatives (particularly when ingested in excess), calcium-based antacids, and several medications commonly prescribed for migraines and depression [50-51].

1.5.6. Diagnosis

Your physician may prescribe diagnostic tests and treatments, such as the following, if they suspect that you have a kidney stone:

Blood testing

The results of your blood tests may suggest that you have an excessive amount of calcium or uric acid in your blood. The results of your blood test are beneficial to your physician in monitoring the condition of your kidneys and may encourage them to investigate additional signs of illness.

Urine testing

It is possible that the analysis of the urine collected over a twenty-four-hour period indicates that you excrete an abnormally high or low number of compounds that trigger stones. In order to conclude this examination, your physician may request that you obtain two urine samples on two separate days.

Fig 04: Urine testing

Imaging

Imaging tests may facilitate the identification of kidney stones in the urinary system. High-speed or dual-energy computerized tomography (CT) may reveal even microscopic stones. The frequency of the use of simple abdomen X-rays has decreased because they can overlook minute kidney stones.

Ultrasound

Ultrasound is an additional imaging technique that may be used to identify kidney stones. This noninvasive test can be performed in a timely and effortless manner.

Examination of stones that have been granted

It would help to urinate while standing over a filter to capture any stones you pass. A laboratory examination will disclose the composition of your kidney stones. Your physician employs this information to ascertain your kidney stones' cause and devise a strategy to prevent their recurrence [52-54].

1.5.7. Prevention

The preventative measures required depend on the type of stone. In addition to ingesting copious fluids, individuals with calcium stones may benefit from the administration of allopurinol, thiazide diuretics, and citrate. Furthermore, allopurinol is advantageous for individuals with elevated uric acid levels in their urine [55-56].

Nutritional considerations

The treatment that is chosen should be tailored to the specific variety of stones that are present. There is some evidence to suggest that diet may have an impact on kidney stones. Medication and dietary modifications are frequently implemented as preventative measures. These measures aim to alleviate the excretory burden of calculogenic substances on the kidneys [57-59]. One of the dietary recommendations to help reduce the risk of developing kidney stones is to increase the total fluid consumption to the point where it produces more than two liters of urine [60]. Another recommendation is to limit the consumption of sugar-sweetened carbonated drinks, such as cola, to less than one liter per day. Restrict the consumption of animal protein to no more than two meals per day (studies on men have shown a correlation between the consumption of animal protein and the recurrence of kidney stones); increasing the intake of citrate or alkali, such as through the consumption of lemon and lime juice.

In contrast, citric acid does not alkalinize urine in the same way as alkali citrate. Alkali citrate is a form of citrate that has been linked to magnesium, potassium, and sodium. This is because the protons in citric acid will mitigate the bicarbonate produced during metabolizing citrate (primarily by the liver and a small amount by the kidney). As a result, the pH of the blood and urine will not be significantly impacted. A decrease in the quantity of calcium excreted in urine correlates with reduced sodium consumption. The treatment of all forms of kidney stones is facilitated by the use of aggressive fluid therapy to dilute urine, making raising urine volume one of the most critical principles in preventing kidney stones. To ensure that one maintains urination, consuming a minimum of 2 liters (68 fluid ounces) of fluid each day is essential. When a substantial quantity of fluid is ingested, the probability of developing kidney stones again may be diminished, or the

interval between episodes of stone formation may be extended without any adverse effects. Calcium will bind to any unattached oxalate that may be present in the gastrointestinal system, thereby preventing its absorption into the circulation. By decreasing the absorption and ingestion of Oxalate, the probability of developing kidney stones may be reduced in susceptible individuals [61].

The calcium in dairy products may act as an oxalate binder, so certain medical professionals advise individuals to increase their consumption. In cases where there is no alternative method to increase the amount of calcium in one's diet, such as lactose intolerance, it may be beneficial to ingest calcium citrate tablets either during or after meals that contain high levels of oxalate foods. Calcium citrate is the preferable calcium supplement for individuals at risk of developing kidney stones, in contrast to calcium carbonate. This is because calcium citrate enhances the excretion of citrate in the urine. Ascorbate is metabolized to Oxalate, so the avoidance of higher doses of supplemental vitamin C and the restriction of the consumption of foods high in Oxalate, such as leaf vegetables, rhubarb, soy products, and chocolate, are two additional prevention strategies that can be implemented in addition to consuming a larger quantity of water orally and consuming more calcium-containing foods. Nevertheless, no randomized controlled trials have been conducted to assess the potential of oxalate restriction in preventing the formation of Stones. There is some evidence to suggest that the consumption of magnesium may reduce the incidence of symptomatic kidney stones [62].

Urine alkalinization

The main component of medical therapy for uric acid stones is urinary alkalinization, sometimes known as an elevation in pH. There are a few different kinds of stones that may be treated with chemolysis, and uric acid stones are one of them. While oral medicine administration is the usual method of chemolysis, antegrade nephrostomy and retrograde ureteral catheters allow for the direct injection of certain irrigating agents into the stone or intravenous agents in rare cases. One possible drug to increase the urine's alkalinity is acetazolamide. In addition to or instead of acetazolamide, several dietary supplements may cause urine to become alkaline. One example is Bicitra, which is a combination of sodium citrate dihydrate and citric acid monohydrate. Other examples are potassium citrate, alkali citrate, sodium bicarbonate, and magnesium citrate. The prevention of

calcium oxalate stone formation and an increase in urine citrate level are two additional benefits of these supplements.

Furthermore, the urine's alkalinity will rise as a result of the alkalinization process. Raising the urine's pH to about 6.5 creates the ideal environment for uric acid stone breakdown. However, while citrate does hinder the crystallization of calcium phosphate, the veracity of this argument is questionable. Urine pH levels higher than 7.0 are associated with an increased risk of calcium phosphate stone formation. One way to help keep the pH in the urine within the target range is to test it often using nitrazine paper. The potential monthly stone dissolving rate with this approach is about 10 mm (0.4 in) of stone radius [63].

Lime that has been slaked

When combined with foods high in oxalic acid, such as green leafy vegetables, it reduces the amount of calcium excreted in human urine.

Diuretics

Diuretics that are analogous to thiazides or contain thiazides, such as chlorthalidone or indapamide, are among the medicinal treatments licensed to prevent stone formation. These medications prevent the formation of calcium-containing stones by decreasing the amount of calcium excreted in the urine. For thiazides to have any therapeutic effect, it is crucial to limit sodium intake, as an excess of sodium leads to calcium excretion. Thiazides are particularly effective in the treatment of renal leak hypercalciuria. This condition is characterized by an excess of calcium in the urine, resulting from a primary kidney malfunction. Absorptive hypercalciuria is a condition that is distinguished by elevated calcium levels in the urine due to excessive absorption from the gastrointestinal tract. Thiazides are advantageous for the management of this condition. Thiazides can reduce calcium absorption [64].

Allopurinol

One of the few drugs with a proven track record of reducing the likelihood of kidney stone recurrence is allopurinol. It is recommended for those who have hyperuricosuria and calcium stones. When allopurinol is present in the liver, it hinders the synthesis of uric acid. Gout and hyperuricemia (high serum uric acid levels) are two more conditions that patients may be

administered this drug to treat. Uric acid in the urine should continually decrease, thus the dose is adjusted accordingly. A common goal of treatment is to get the blood uric acid level down to 6 mg/100 ml or below. Although hyperuricemia is associated with an increased risk of generating uric acid stones, hyperuricosuria may happen even when serum uric acid levels are normal or slightly elevated. If hyperuricemia and hyperuricosuria persist despite taking a urine-alkalinizing medication such potassium citrate or sodium bicarbonate, some doctors advise using allopurinol alone [65].

1.5.8. Treatment

The treatment of kidney stones is contingent upon the variety of rocks and the underlying cause of the condition—smaller stones that generate negligible symptoms [66]. The vast majority of kidney stones can be treated non-invasively. It may be possible to prevent yourself from stepping on a small stone:

Water intended for human consumption: Maintaining the diluting quality of one's urine through the consumption of 2 to 3 quarts (1.8 to 3.6 liters) of water daily may prevent the formation of stones in the urinary tract. It is advisable to consume an adequate quantity of fluids, with the majority of fluids being water, to ensure that your urine is either nearly or obvious unless your physician has given you a different recommendation [67].

Analgesics: The passage of a minor stone could cause substantial discomfort. Your physician may prescribe pain medications, including naproxen sodium (Aleve) and ibuprofen (found in Advil, Motrin IB, and other brands), to alleviate moderate pain [68].

Treatment for medical purposes: Your physician may prescribe medication to facilitate the passage of your kidney stone. Medications known as alpha-blockers are designed to relax the muscles in the ureter, thereby facilitating the passage of kidney stones and reducing the duration and severity of the distress they cause. The medication combination dutasteride and tamsulosin, which is marketed under the brand name Flomax, and tamsulosin, which is sold under the brand name Flomax (Jalyn), are both examples of alpha-blockers [69].

Fig 05: Tamsulosin.

Surgery: Most stones may pass through unaided if their diameter is smaller than 5 millimeters (0.2 inches). In cases when a patient has a kidney infection, chronic discomfort, bilateral blocking stones, or only one working kidney, immediate surgery may be required. People with a single kidney will experience this. The mid-1980s saw a change in surgical treatment for urolithiasis, with ureteroscopy, percutaneous nephrolithotomy, and extracorporeal shock wave lithotripsy replacing open surgery as the favored method [70]. In terms of surgical therapy for urolithiasis, these treatments are now seen to be the gold standard. The evolution of flexible ureteroscopy, a prerequisite for percutaneous nephrolithotomy, has recently paved the way for retrograde nephrostomy. Despite promising early results, this approach is currently being studied. Percutaneous nephrolithotomy or, in very rare instances, atrophic nephrolithotomy, is the therapy of choice for big or difficult stones (such calyceal staghorn calculi) or stones that cannot be removed with less invasive methods. Both procedures include working on the kidneys [71].

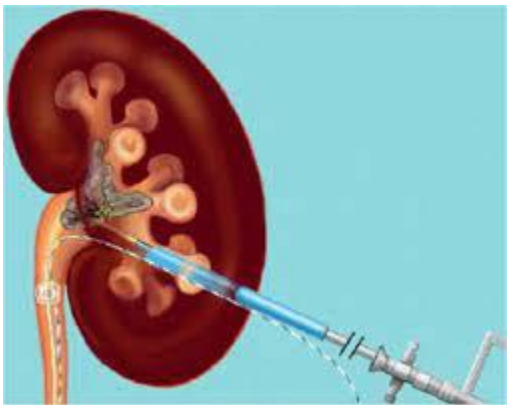

Fig 06: Percutaneous nephrolithotomy.

1.6. The Prevention and Management of Kidney Stones with dietary plants

Kidney stones are a prevalent urological disorder, affecting a substantial portion of the global population. Dietary plants have emerged as promising alternatives or adjuncts to conventional therapies for kidney stone prevention and management. This is due to the bioactive compounds in these plants, which exhibit anti-urolithiatic properties. The efficacy of these plants in inhibiting stone formation, fostering the dissolution of existing stones, and reducing recurrence rates has been the subject of numerous preclinical and clinical studies.

1.6.1. Preclinical Evidence

The function of various plant preparations in minimizing calcium oxalate deposition, one of the primary causes of kidney stone formation, has been demonstrated in animal models. Phyllanthus niruri (commonly referred to as Chanca Piedra) and Tribulus terrestris are two plants that have been the subject of extensive research. Phyllanthus niruri has been demonstrated to inhibit the growth of calcium oxalate crystals and facilitate their expulsion through its diuretic properties. Furthermore, the presence of flavonoids and polyphenols in these plants has been shown to

function as antioxidants, thereby reducing oxidative stress and inflammation, which are factors in the formation of stones [72].

1.6.2. Clinical Evidence

These findings are further substantiated by human trials, which suggest that individuals who consume plant-based interventions, whether in the form of extracts or dietary supplements, experience enhanced urinary health and reduced stone formation.. For instance, studies conducted on Cratoxylum formosum and Zingiber officinale have shown a substantial decrease in the incidence of stone recurrence in individuals who are susceptible to kidney stones. This reduction is primarily attributable to their capacity to modulate urinary oxalate levels and enhance renal function [73].

1.6.3. Molecular Mechanisms

The bioactive compounds in these plants target a variety of pathways that are involved in the formation of stones at the molecular level. They prevent the nucleation, aggregation, and retention of crystals in the kidneys. Furthermore, the metabolism of calcium oxalate is influenced by compounds such as saponins and alkaloids, which increase the solubility of these crystals, thereby facilitating their excretion. They also prevent tissue injury and promote overall kidney health by influencing the expression of genes associated with renal inflammation [74].

Plant	Part of Plant	Study Type	Study Design	Results
Green tea (Camellia sinensis)	Leaves of kidney stones	In vivo	Ethylene glycol (EG)-induced nephrolithiasis in rat	↓ Calcium crystal depositions in the kidneys ↓ The osteopontin mRNA level
	Leaves	In vivo	EG-induced nephrolithiasis in rat	↓ Urinary oxalate excretion, calcium oxalate deposit formation ↑ Sodium Oxide Dismutase (SOD) activity
Rasberry (Rubus idaeus)	Aqueous extract	In vivo	Glyoxylate-induced calcium oxalate (CaOx) nephrolithiasis in mice	↓ Generation of malondialdehyde (MDA) and protein carbonyls ↓ Urinary calcium and phosphorus levels ↓ The growth rate of calculus
	Methanolic extract	In vivo	Bicarbonate saline solution (containing 110 mM NaCl and 30 mM NaHCO3) induced nephrolithiasis in rats	↓ Activity of aldosterone or epithelial sodium channels ↑ Urine volume
Parsley (Petroselinum sativum Hoffm.)	Ethanolic extract	In vivo	EG+ ammonium chloride (AlCl3)-induced urolithiasis in rat	↓ Urinary calcium and protein excretion ↑ Urinary pH
	Aqueous Extract	In vivo	EG-induced urolithiasis in rats	↓ Serum urea and uric acid concentrations ↑ Serum magnesium concentration
Pomegranate (Punica granatum)	Fruits chloroform and methanol extract	In vivo	EG-induced urolithiasis	↓ Urine oxalate, calcium and phosphate, renal tissue oxalates ↓ Serum creatinine, urea and uric acid
Yellow-fruit nightshade (Solanum xanthocarpum)	The methanolic extract	In vivo	EG-induced urolithiasis in rats	↓ Renal hyperoxaluria and crystalluria, ↓ Supersaturation of calcium oxalate
Stinging nettle (Urtica dioica)	Methanolic extract	In vivo	EG-induced urolithiasis in rats	↓ Urinary creatinine level and the supersaturation of lithogenic enhancing agents
Khella (Ammi visnaga L.)	Aqueous extract of fruits	In vivo	EG+ aluminum chloride-induced urolithiasis in rats	↓ Calcium oxalate crystal deposition ↑ Urinary excretion of citrate ↓ Oxalate excretion
Black-cumin (Nigella Sativa L.)	Ethanolicextract of seeds	In vivo	Ethylene glycol for induction of calcium oxalate calculus formation in rats	↓ Number of calcium oxalate deposits ↓ Urine concentration of calcium oxalate
	Thymoquinone (major component of seeds)	In vivo	Ethylene glycol-induced kidney calculi in rats	↓ Number and size of calcium oxalate deposits in the renal tubules
Citrus aurantium L.	Aqueous extract of unripe fruit	In vivo	EG -induced calcium oxalate crystallization	Preventing the formation of calcium oxalate nephrolithiasis and pathological alterations in rats
Khella (Ammi visnaga L.)	aqueous extract	In vitro	A flask containing a cystine stone	↑ Dissolution rate of cystine stones
Mastic (Pistacia lentiscus)	ethanolic fruit extract	In vitro	Calcium oxalate monohydrate-induced in Human Kidney (HK)-2 cells	↓ Cell death induced by COM, ↓ The level of E-cadherin and H_2O_2
Roselle (Dolichos biflorus L.)	Hydro-alcoholic extract of seeds	In vitro	Calcium oxalate crystallization using a synthetic urine system	↓ Nucleation and aggregation of calcium oxalate monohydrate crystals
	Aqueous, chloroform, and benzene extracts of seed	In vitro	Experimental preparation of kidney stones; calcium oxalate and calcium phosphate	Dissolving calcium oxalate stones
Oregano (Origanum vulgare L.)	Crude aqueous-methanolic extract	In vitro	Supersaturated solution of calcium oxalate, kidney epithelial cell lines (MDCK) and urinary bladder of rabbits	↓ Calcium oxalate crystallization Exerting antioxidant, renal epithelial cell protective and antispasmodic activities
Solanum xanthocarpum	Saponin rich fraction prepared from fruits	In vitro	calcium oxalate crystal nucleation. artificial urine solution	↓ Calcium oxalate crystal formation ↑ Glycosaminoglycan level
Horse gram (Dolichos biflorus L.)	Seed	Clinical	24 patients received Dolichosbiflorus and 23 patients were given potassium citrate	↓ Recurrence of calcium oxalate stone

Table 01: Nutritional plants used for treatment and prevention of kidney stones [75].

1.7. Preventing Kidney Stones with a Natural Diet

Recent human research suggests that diets that are rich in fruits and vegetables may be beneficial in the prevention of urolithiasis. Epidemiological research has demonstrated that diet is one of the primary risk factors for renal disease. In small-scale human investigations, it has been demonstrated that diets that are high in plant-based protein, as opposed to animal-based protein, can alleviate metabolic acidosis. This, in turn, retards the progression of nephropathy in patients with chronic kidney disease [76]. These dietary interventions, particularly those that focus on the reduction of acidity through the use of sodium-based alkalis, have become indispensable protective strategies for individuals with a reduced glomerular filtration rate (GFR) [77].

Research has shown that the regular consumption of plant-rich diets enhances the volume and pH of urine, as well as the excretion of stone inhibitors such as phytate, citrate, potassium, and magnesium. The supersaturation of calcium oxalate and uric acid is diminished by these inhibitors. Phytate, the primary form of phosphate found in natural plant sources, is a significant factor in the prevention of urolithiasis. It inhibits the formation of crystals in the urine by forming insoluble complexes with calcium in the intestines [78]. The alkali burden resulting from such a diet has been found to have a protective effect against kidney stone formation by increasing urinary citrate levels [79]. Furthermore, the formation of stones can be reduced by consuming dietary fiber from fruits and vegetables. The binding of non-digestible components in fiber to minerals and lipids in the gastrointestinal tract reduces the urinary excretion of oxalate and calcium, which are two of the primary contributors to stone formation [80]. A human study that examined the correlation between the risk of urolithiasis and the consumption of dietary plants, fruits, and vegetables found that a higher intake of these foods was substantially associated with a reduced risk of kidney stone development [81]. This relationship also safeguarded women with a history of kidney stones, suggesting that a diet rich in fruits and vegetables could decrease the probability of recurring stone formation.

Literature Review

2.1. Coe, F. L., Evan, A., & Worcester, E. (2005). Kidney stone disease. The Journal of clinical investigation, 115(10), 2598-2608.

An estimated 5% of American women and 12% of American males are now plagued by kidney stones, and this number is rising across both sexes. Ten percent of stones are struvite, a magnesium ammonium phosphate made when bacteria infect with the urease enzyme; nine percent are uric acid (UA); one percent are cysteine (Cys); one percent are ammonium acid urate (AAU); and one percent are stones caused by drugs. Just around eighty percent of stones are composed of calcium oxalate (CaOx) and calcium phosphate (CaP). When these chemicals undergo an undesirable phase shift from a liquid to a solid state, rocks are formed. The UA, CaOx, and CaP pathogenic processes that contribute to the production of cystine stones will be discussed in this section. This includes the most current research on the genetic reasons, the alterations that occur in human kidney tissue as a consequence, and the therapies that are now available.

2.2. Uribarri, J., Oh, M. S., & Carroll, H. J. (1989). The first kidney stone. Annals of internal medicine, 111(12), 1006-1009.

We collected evidence-based data on the most effective methods for diagnosing and treating patients experiencing their first episode of a calcium-containing kidney stone, as this population is contentious. The "natural cumulative recurrence rate of renal stones" is 14% at one year, 35% at five years, and 52% at ten years, as indicated by six significant retrospective investigations. Both allopurinol and thiazides have exhibited a marginally more substantial impact than placebo in randomized controlled trials, with an estimated 35% difference. We have determined that the administration of specific medication therapies, such as allopurinol or thiazides, is not appropriate for patients who have experienced their first kidney stone. This is because the risk of this therapy is approximately 5%, the morbidity associated with renal stones is limited, and relatively less invasive procedures can frequently supplant nephrolithotomy.

2.3. Alelign, T., & Petros, B. (2018). Kidney stone disease: an update on current concepts. Advances in urology, 2018.

Kidney stone disease is characterized by the development of crystal concretions mostly inside the kidneys. Human health is linked to a urological illness that is becoming more common and impacts about 12% of the world's population. It has been associated with an increased risk of developing end-stage kidney disease. Stones in the kidneys develop after a long and intricate process. The renal papillary surfaces generate calcium oxalate, the most prevalent kind of kidney stone, at Randall's plaque. A wide variety of physicochemical reactions, such as supersaturation, nucleation, growth, aggregation, and the retention of urinary stone components inside tubular cells, come together to produce stones. An equilibrium between chemicals that stimulate or inhibit urine precipitation regulates these phases. There is evidence that cellular damage may increase particle retention on renal papillary surfaces. Chronic oxalate exposure in renal epithelial cells triggers a series of events that culminate in p38 mitogen-activated protein kinase pathways-mediated cell death. At this time, there is no medicine that has been shown to effectively treat or prevent the recurrence of renal stones. So, in order to control urolithiasis with new drugs, researchers are looking at the causes of kidney stones. The purpose of this research is to provide light on the causes, pathophysiology, and prevention methods of kidney stones.

Goal of My Studies

3. Goal of my studies

The purpose of this investigation is to ascertain the incidence of kidney disease.

- ☑ Identifying the principal cause of renal stones.
- ☑ To thoroughly examine the public's viewpoint on renal stones.
- ☑ To evaluate the existing treatment for kidney stones.
- ☑ To ascertain procedures for renal stone management.
- ☑ To establish a novel discipline of higher education.

Methodology

4.1. Target Population:

The questionnaire commences with a review and 16 precisely targeted inquiries. 117 individuals between the ages of 10 and 80 are interested in participating in this study.

4.2. Research Design:

I am conducting this survey to ascertain individuals' opinions regarding kidney stones and their impact on their well-being and contentment. The survey was conducted entirely on the ground, and the target population was invited to participate by physically filling out the questionnaires.

4.3. Method of Data Analysis:

All information was analyzed for precision and internal consistency to eliminate any lacking or conflicting data. Any data that was determined to be inaccurate was discarded. Information analysis was conducted using the most frequently updated version of Microsoft.

4.4. Ethical Considerations

Verbal authorization was granted to the investigation members before the commencement of the information collection. The study subjects were informed they could disengage from the program at any point, and the respondents-maintained anonymity.

4.5. Survey Question:

"A comprehensive survey on kidney stone and Evaluating the Efficacy of Novel Pharmacological Agents in Kidney Stone Management"

1. Patient Name ……...

2. Gender

- Male
- Female

3. Occupation

- Student
- Job Holder
- Business
- Others

4. Education Level

- College Student
- Undergraduate student
- Postgraduate student

5. Your Age

- Under 20 years old
- 20-40 years old
- Upper 40 years old

6. Location

- Rural
- Urban

7. Do you know about Kidney stones?

- Yes
- No

8. Do you suffer from Kidney stones?

- Yes
- No

9. How long have you suffered from Kidney stones?

- Under one year
- 1-3 years
- Upper 3 years

10. How many stones do you have in your kidney?

- 1
- 2
- More then 2

11. What do you think about the cause of Kidney stones?

- Drinking too little water
- Exercise (too much or too little)
- Eating food with too much salt or sugar
- Obesity
- Weight loss surgery

12. Do you ever follow up doctor for Kidney stones?

- Yes
- No

13. Do you take any medicine for Kidney stones?

- Yes
- No

14. Which type of medical therapy do you take for Kidney stones?

- Extracorporeal shock wave lithotripsy (ESWL)
- Percutaneous nephrolithotripsy (PCNL)
- Ureteroscopy

15. Do you have any family history of Kidney Stones?

- Yes
- No

16. Do you think kidney stone affects your lifestyle?

- Yes
- No

17. Which of the following medications have you taken with the intention of preventing kidney stones?

- Allopurinol
- Potassium Citrate
- Tamsulosin
- Hydrochlorothiazide
- Magnesium Oxide
- Others

18. How effective do you feel the medication you've taken was in preventing kidney stones?

- Very ineffective
- Ineffective
- Neutral
- Effective
- Very effective

Result and Discussion

5.1. Gender

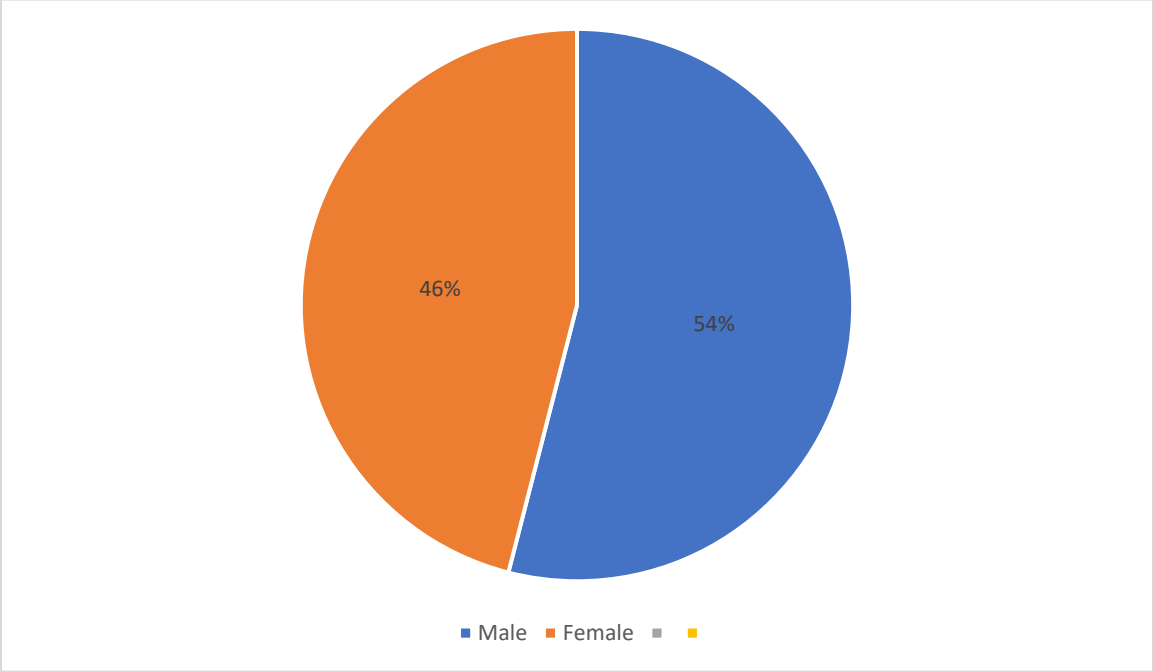

Fig 07: Gender

This survey indicates that 46% of females are affected by kidney stones. 54% of women are affected by kidney stones.

Comment: Males are more susceptible to anguish than females.

5.2. Age

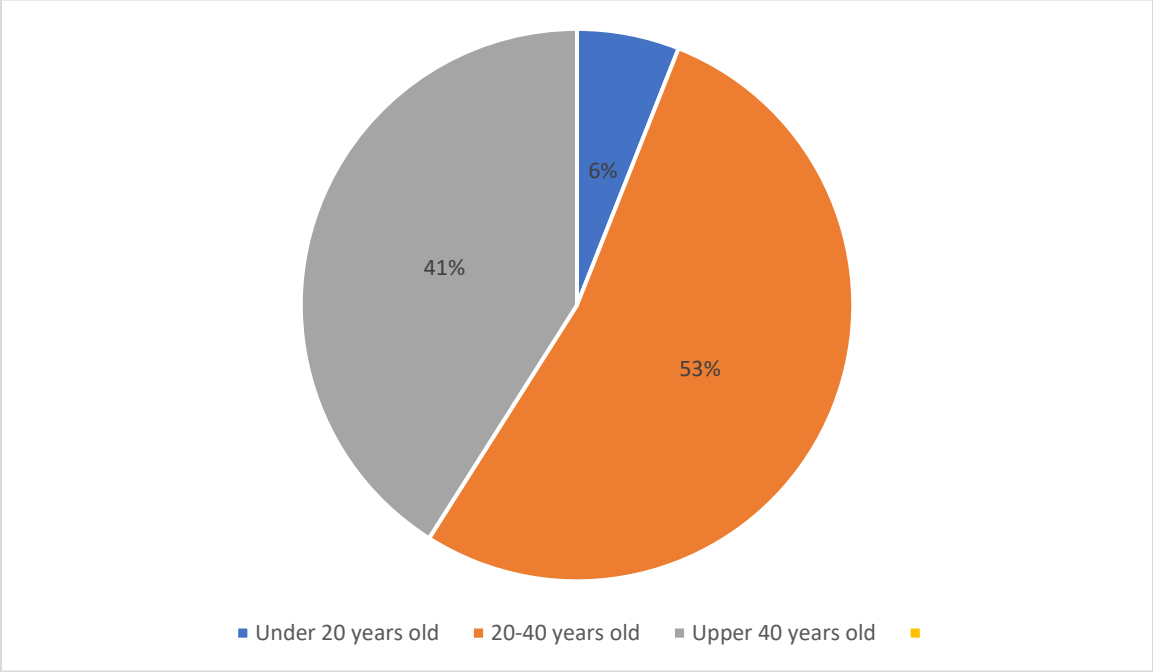

Fig 08: Age

In this survey, 53% of the patents are held by individuals aged 20 to 40. Fourteen percent of the population is over the age of forty, and six percent is under the age of twenty.

Comment: Age is a factor in the development of kidney stones. Older individuals are more susceptible to suffering than their youthful counterparts.

5.3. Family History

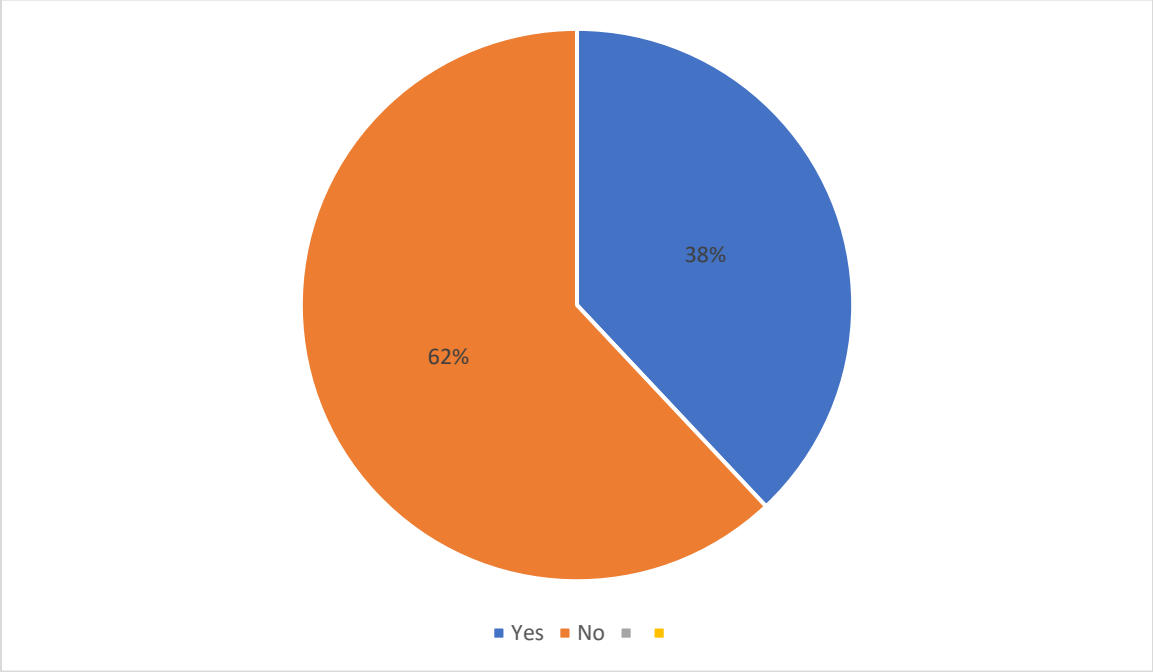

Fig 09: Family History

In this survey, 62% of respondents indicated that they did not have a family history of kidney stones. A family history is present in only 38% of individuals.

5.4. Knowledge

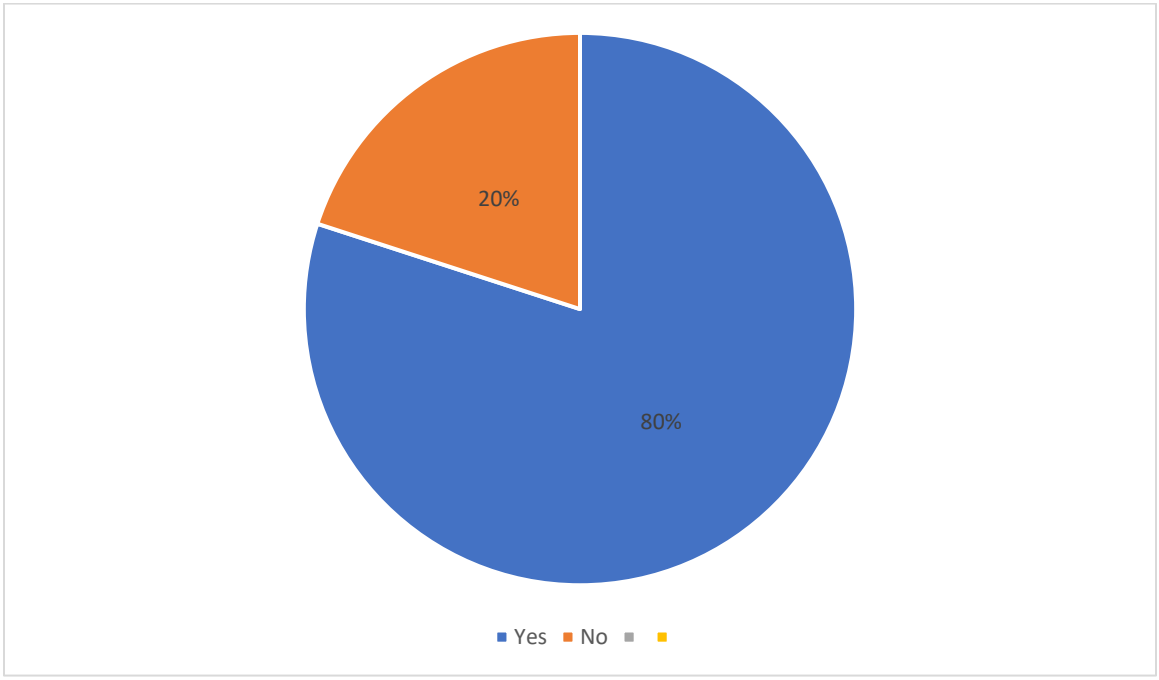

Fig 10: Knowledge

Eighty percent of respondents in this survey are knowledgeable about kidney stones, whereas twenty percent of the populace is unaware.

5.5. Suffering

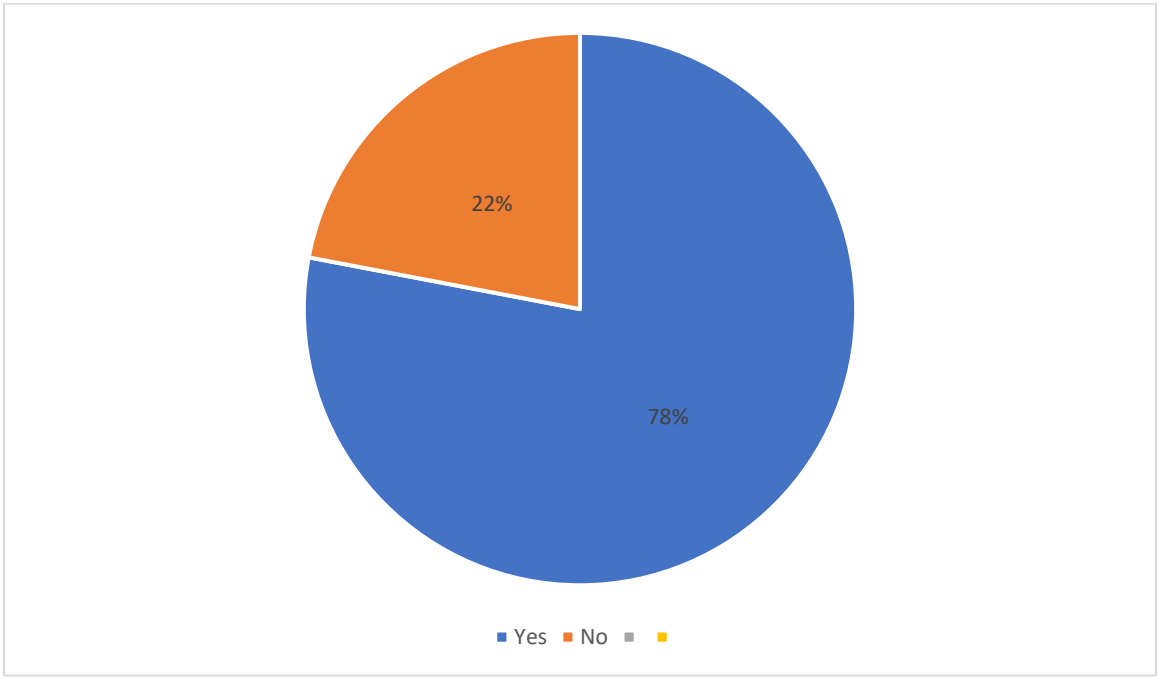

Fig 11: Suffering

78% of respondents in this survey encountered kidney stones, while 22% of the population is not affected by these diseases.

5.6. Duration

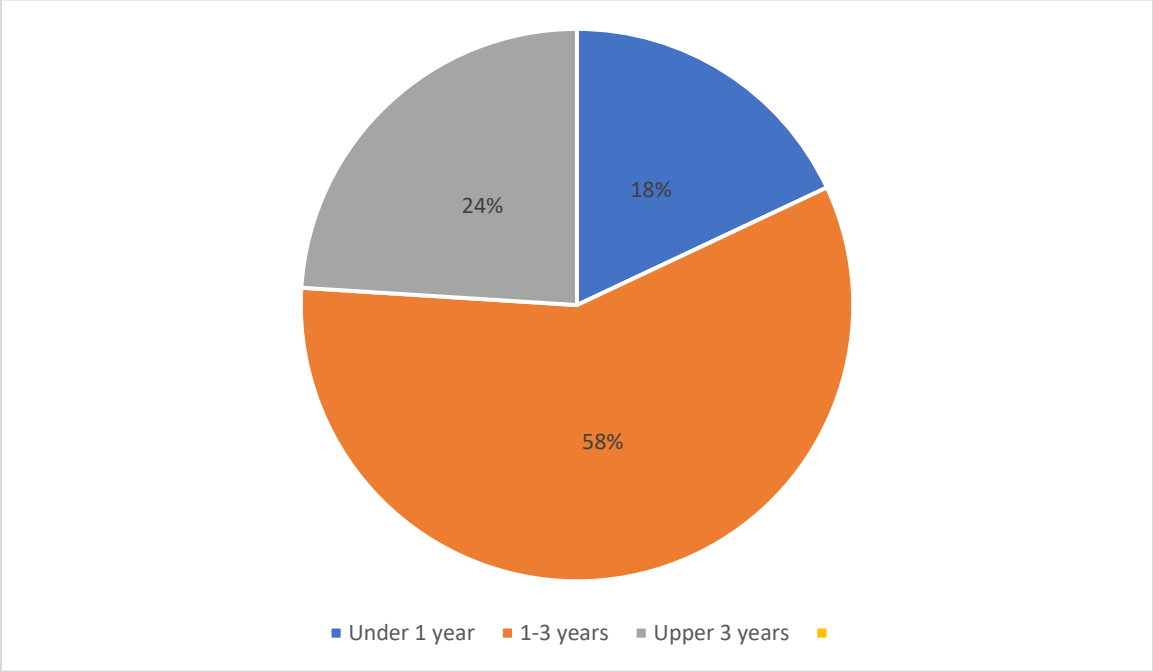

Fig 12: Duration

According to this survey, kidney stones have been encountered by 58% of individuals within the last three years. There are 18% of individuals who have been experiencing symptoms for less than one year. Upper-third-grade dementia symptoms are being experienced by twenty-four percent of the population.

5.7. Number of kidney stone in kidney

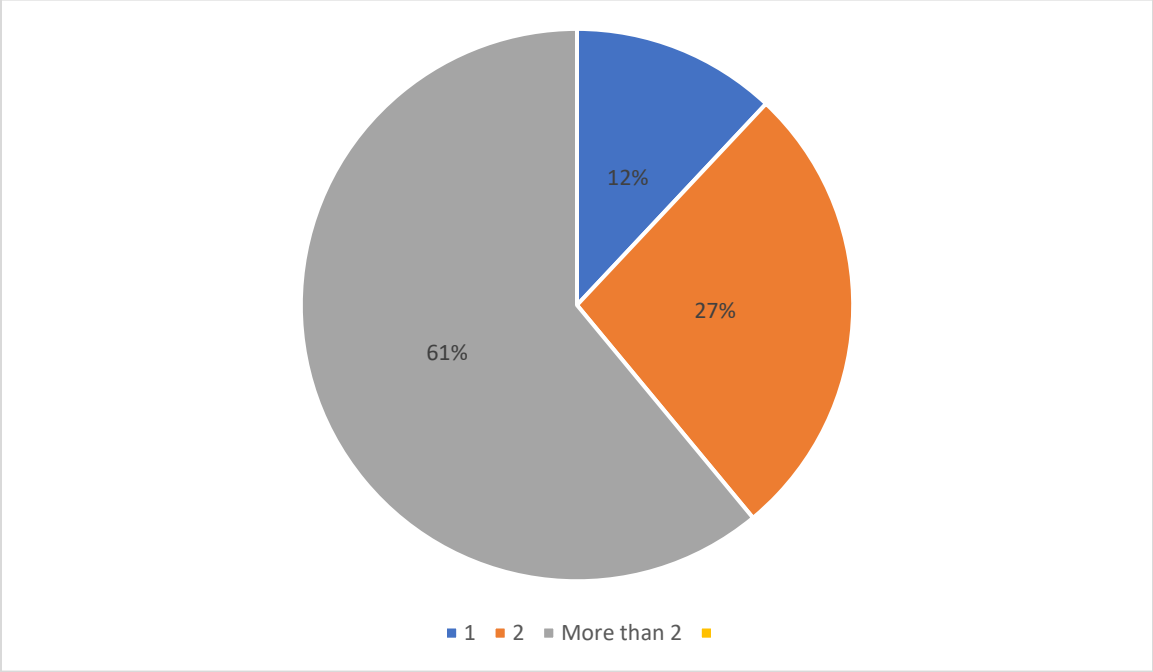

Fig 13: Number of kidney stone in kidney

61% of respondents reported having more than two kidney stones, as indicated by this survey. Two stones are present in the kidneys in 27% of individuals. A single stone is present in 12% of individuals.

5.8. Cause of kidney stone

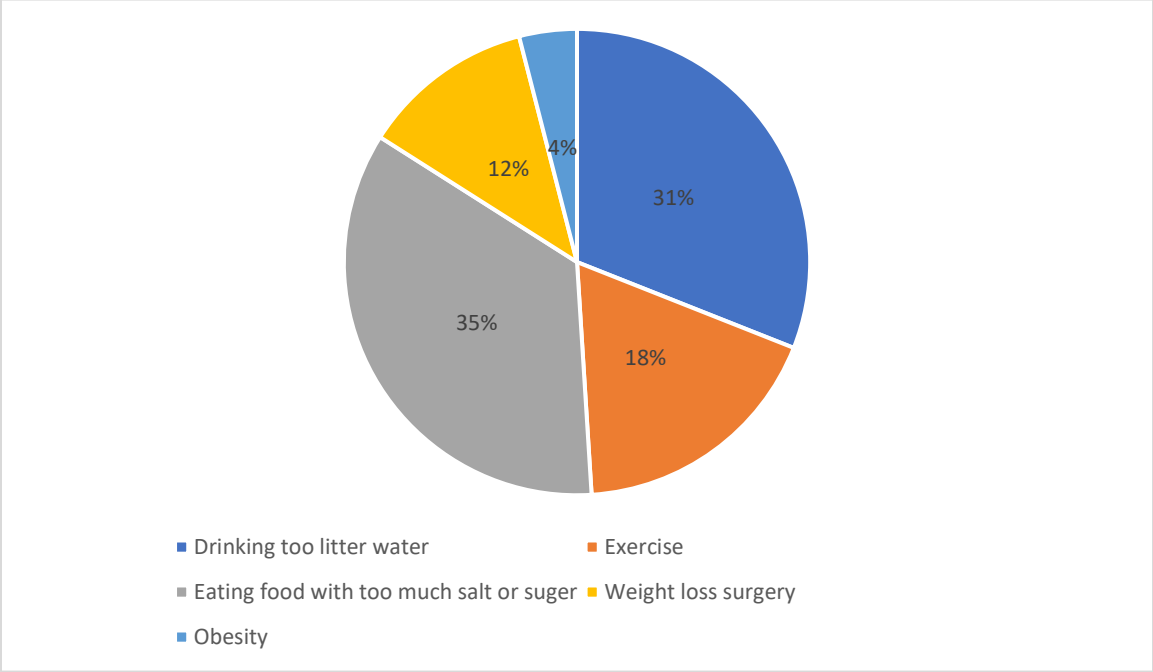

Fig 14: Cause of kidney stone

According to this survey, 31% of respondents believe that kidney stones are caused by insufficient water intake. 35% of individuals believe that the consumption of food that is excessively sweet or salted is the primary cause of kidney stones. 18% of the population believes that kidney stones are caused by gluttony and exercise.

5.9. Medical therapy

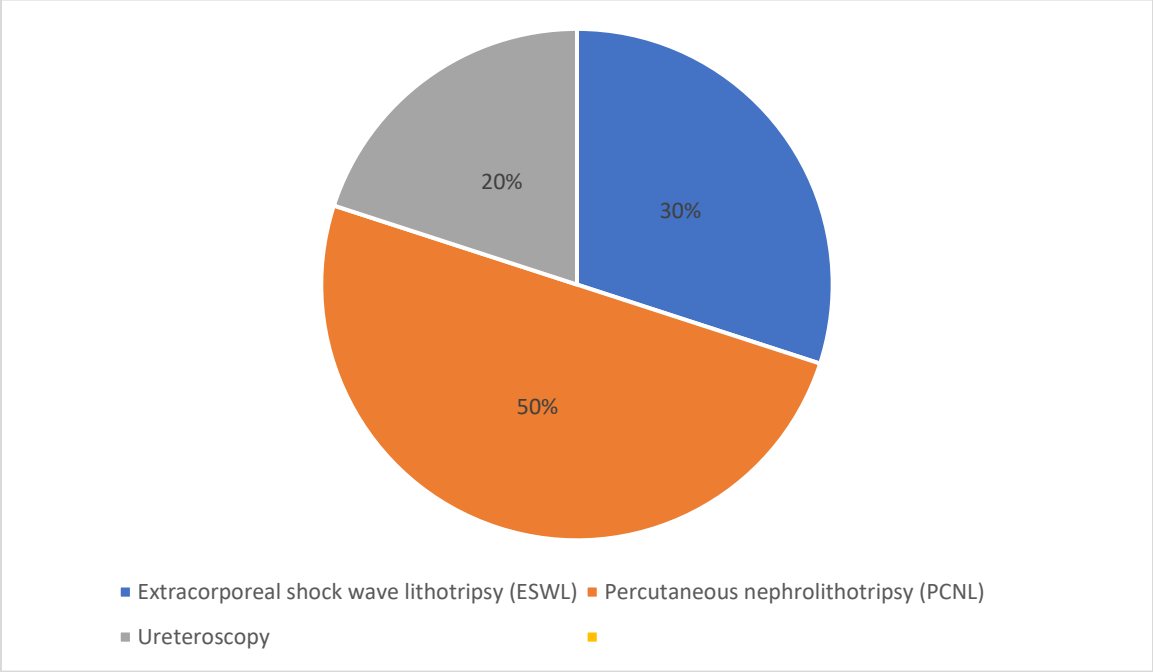

Fig 15: Medical therapy

According to this survey, 30% of individuals employ extracorporeal shock wave lithotripsy (ESWL) as a medical treatment. 50% of the population undergoes percutaneous nephrolithotripsy (PCNL). Ureteroscopy is administered to approximately 20% of the population.

5.10. Taking any medicine

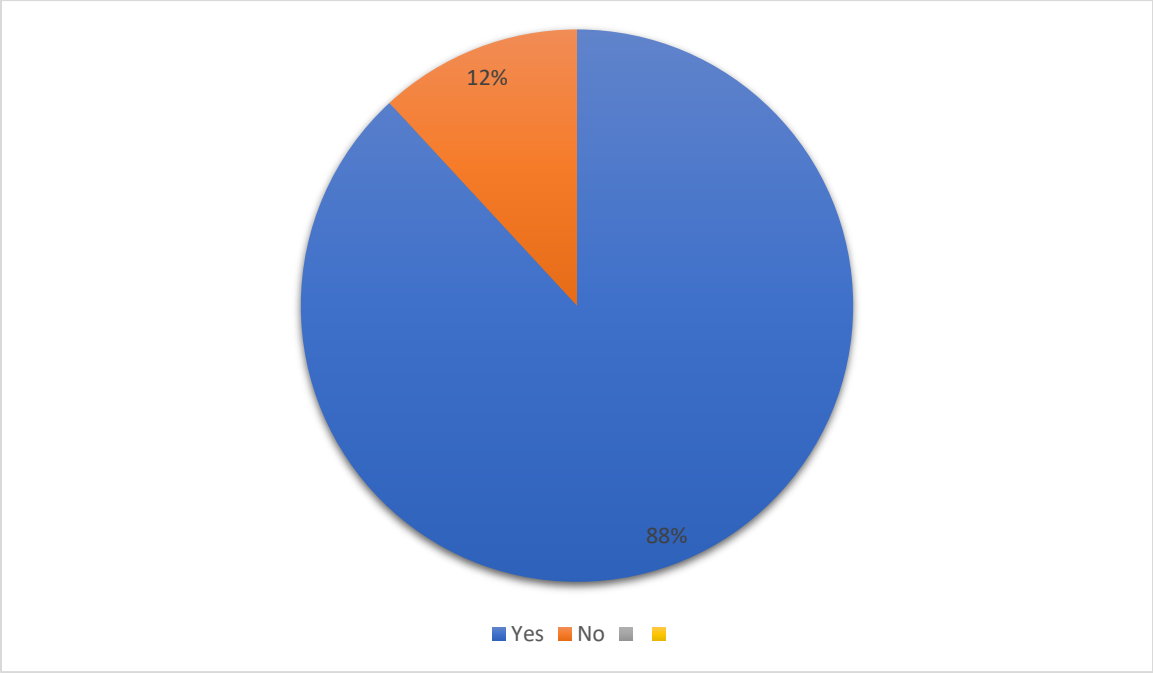

Fig 16: Taking Medicine

According to the survey there are 88% people were taken medicine during kidney stone. While 12% people didn't suppose to take any medicine.

5.11. Which of the following medications have taken

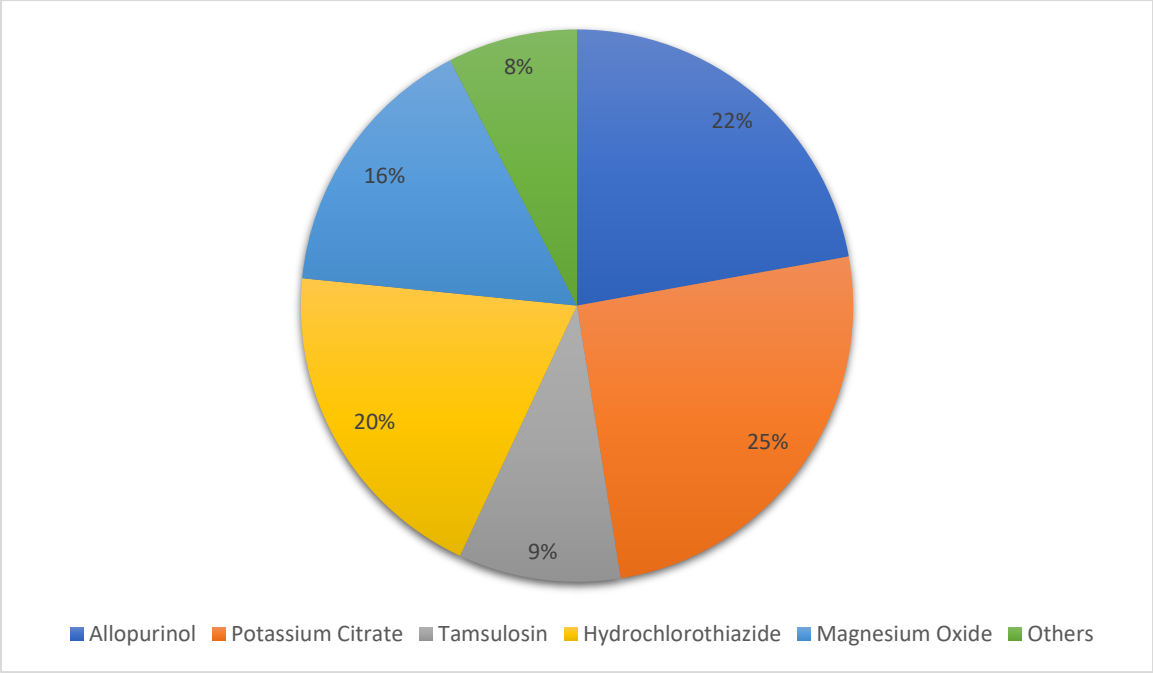

Fig 17: Which of the following medications have taken

In this survey, there 25% people have taken potassium citrate. Where others medicine allopurinol, tamsulosin, hydrochlorothiazide & magnesium oxide respectively taken 22%, 9%, 20% & 16%. Rest of others taken others medication.

5.12. Lifestyle

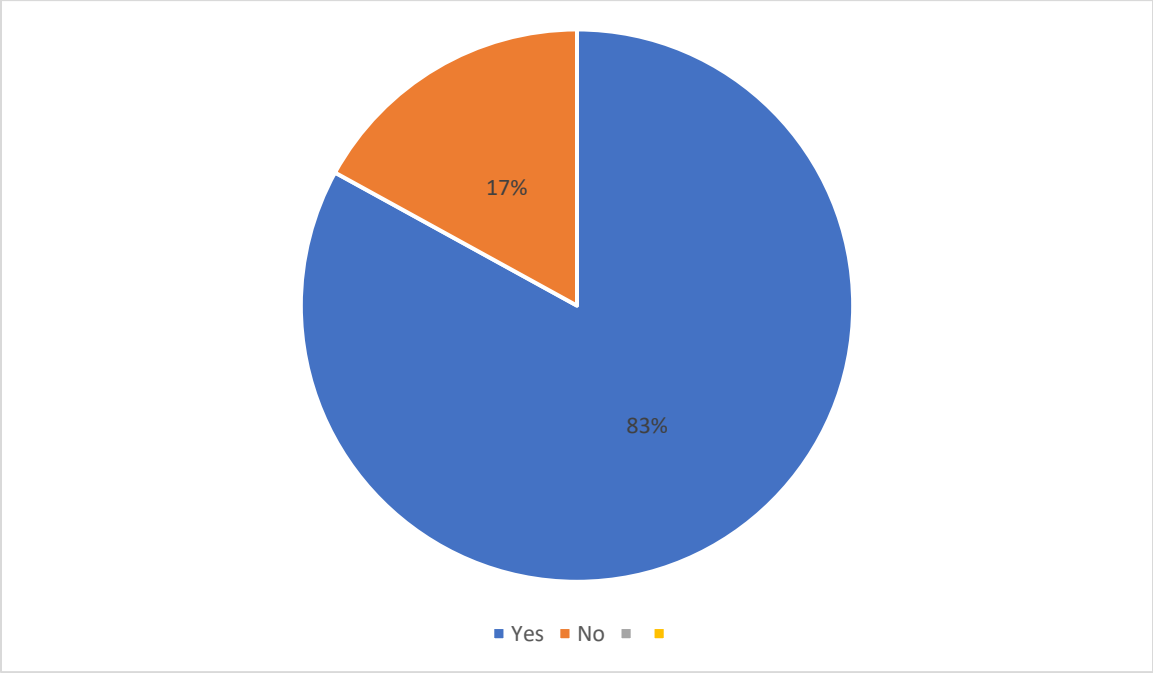

Fig 18: Lifestyle

In this survey, 83% of respondents assert that kidney stones affect their lifestyle, while 17% are under the impression that they do not.

Conclusion

6. Conclusion

When urine contains an excessive quantity of specific minerals or ions (pee), kidney stones may form. A kidney stone analysis is a diagnostic procedure that determines the chemical composition of a kidney stone. This information benefits your healthcare provider when developing a strategy to mitigate the probability of future stone formation. If not appropriately treated, kidney stones may lead to irreversible kidney injury, which can manifest as ureter obstruction, blood in the urine, recurrent urinary tract infections, regurgitation, and excruciating urination.

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