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PREVENTION AND TREATMENT OF NEPHROLITHIASIS USING TRADITIONAL MEDICINAL PLANTS: A REVIEW

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ABSTRACT

All ages, races and genders are affected by the intensely painful disorder known as nephrolithiasis, which is frequently recurrent.10-15% of people will experience nephrolithiasis at some point in their lives, a portion of these patients will have recurring calculi following surgical or spontaneous passage. Preventing these recurring stones occurrences is a key therapy objective because they are exceedingly morbid and may eventually result in major chronic renal impairment. Despite advancement in medical procedure like stone extraction (PCNL and ESWL), the incidence of nephrolithiasis is still relatively common globally and there is no genuinely effective medication for the treatment of renal calculi. Numerous Indian medicinal plants have been utilized to treat nephrolithiasis. It has been said that they are efficient and have less adverse effects. For the creation of new therapeutic approaches, additional investigation into the physiopathological relationship amongst kidney calculi production and these structural illnesses is required. Purposed use of medicinal plants in curing nephrolithiasis is critically evaluated in the current evaluation of the literature.[4] Therefore, the particulars in the current expansion of the study of medicinal plants having anti-nephrolithiatic effect have been shown in this article. Phytotherapy is currently gaining ground in the field of nephrolithiasis care, opening up a wide window for effective treatment.

KEYWORDS: Nephrolithiasis, Calcium oxalate crystals, Kidney stones, Plant extract, Traditional medicines.

INTRODUCTION

One of the forebearer disorders of the urinary tract system is "Nephrolithiasis". There is formation of calculi in lumen or in renal pelvis.[1] Renal stones are the third most prevalent urinary tract disorder.[2] Around 12% of the world's population is suffering from nephrolithiasis with the rate of repetition being higher in males (70-80%) as compared to the females (47-60%). When a person gets diagnosed with kidney stones, there are chances of recurrence and the rate of repetitiveness is around 10% in one year, 35%in 5 years and can become to 50% within 10 years.[3] Upper urinary tract stones have become more common in developed countries during the past century, but there are notable differences between countries and even within the closely related countries. Systemic stones now carry a greater lifetime risk than they did a few decades ago. All across the world, nephrolithiasis or kidney stones are common. Nephrologists and general practitioners must be familiar with the epidemiology of this disease in light of these changes. Supersaturation of stone components in the urine and factors affecting their solubility, such as urine volume, pH, and total solute excretion, are the basic pathophysiology and pathogenesis of stone formation.[4] It is a common knowledge that the kidneys reabsorb water and increase the concentration of certain solutes that could precipitate and crystallize. Therefore, a calculus can arise from any subject.[44] Almost eighty percent of calculi comprises of CaOx and CaP. The process of renal stone formation is convoluted and it involves a number of processes namely, supersaturation, nucleation, growth and the confinement of salts in the renal tubules.[5] The renal stones can result in unbearable pain and can consequently lead to the blockage of flow of urine.[2] Because of the significant risk factors associated with the current therapy of kidney stones, we are looking back for a less severe or side effect free treatment using herbal medicinal plant.[6] Women who have had kidney stones in the past and either recently formed or long-term men are at higher risk for CVD. Furtherresearch was called for on the metabolic and non- metabolic processes that connect kidney stones and the risk of CVD.[7] With a high likelihood of recurrence after stone removal, kidney stone disease a major global health concern. Therefore, it is essential to create efficient plans to stop the growth of fresh or recurring stones.[8]

Natural plant compounds (NPCs) have historically been utilized as medicines and their chemical makeup may one day lead to novel medicinal possibilities. NPCs are potent compounds derived from plants that have the ability to alter a number of pathways including the epithelial to mesenchymal transition (EMT),using methods that are antioxidant,anti-

inflammatory or anti-fibrotic.[26] According to WHO, 70-95% of people in underdeveloped nations still rely mainly on medicinal plants for their main healthcare needs.[30]

Kidney stones are more common now than in previous decades,and this is most likely due to changes in lifestyle (low physical activity levels) and food habits (high protein, salt and sugar diets) throughout all industrialized nations.According to a growing body of research, nephrolithiasis development May be significantly influenced by abnormalities of the urea cycle, purine metabolism, angiogenesis, inflammation and the oxidant-antioxidant balance.[37] The prevalence of urolithiasis fluctuates with the socioeconomic and health level of the population. It is distinguished in this manner by crystalline concretion because concretion in the urinary tract, which is a common disease in the populace that is active. Consequently, it has an impact on the neighbourhood.4-20% of the total population in various nations. However, it is frequently recurring and has a variable origin. Herniaria hirsute L., Opuntia ficus-indica and other medicinal herbs have all been used traditionally to treat urinary stones.[40]

Epidemiology

Kidney stones are becoming more commonaccording to several studies. According to a survey conducted in 1994, the incidence among persons aged 20 to 74 grew from 3.2% between 1976 and 1980 to 5.2% between 1988 and 1994. Data analysis of surveys conducted from 2007-2010 demonstrated a steady rise in the total prevalence, which now stands at 8.8%. Males were more likely than females to have a history of kidney stones (10.6% vs 7.1%).[9] Within the age of 20-49, men are more likely than women to experience it.[10] Kidney stones are rare before the age of 20, their occurrence increases between the ages of 20 and 30 and then remains largely steady until the age of 70, at which point it begins to decline. This is true for all western countries. Between the ages of 30 and 70, estimated of the incidence of first kidney stones range from 50-100 per 100,000 for women and 100 to 300 per 100,000 for males.[11]

Kidney stones affect about 2 million people in India each year. In several regions of the nation, including Maharashtra, Gujarat, Delhi, Rajasthan, Punjab, Haryana and some other areas of Northeast side, kidney stone prevalence is higher. In India, over 50% of those with nephrolithiasis may experience renal injury or loss of kidney function.[12] Bladder stones made up 30% of all urinary stones in India in 1965, but their prevalence had decreased to 5% by 1985. In parallel. The chemical makeup of stones in the upper urinary system changed,

calcium oxalate stone prevalence increased from 26%-82%, whereas struvite stone prevalence decreased from 20%-5%.[35]

Nephrolithiasis will affect between 3 and 5% of people at some point in their lives. Up to 50% of these individuals will experience a recurrence within 10 years, depending on the type of stone. There has not yet been sufficient evidence to prove that nephrolithiasis is heritable, despite the fact that a number of the diseases that cause it (such as familial renal tubular acidosis and cystinuria) are inherited. White people supposedly have as twice as high prevalence of stone illness then Asian people do.[36]

Types of nephrolithiasis

Nephrolithiasis develops when the minerals in highly concentrated urine combine with the calcium to create crystals (stone). There are typically four distinct forms of calculi which are mentioned below-

1. **Calcium oxalate stone:** Among all kidney stones, CaOx and CaP are two of its widespread kinds. All radiographs of calcium oxalate and calcium phosphate stones show that they exist as tiny (1cm diameter), dense, and, and sharply encircled.[3] The origin of calcium oxalate stones is considered to be Randall's plaques.[27] Calcium oxalate stones can develop due to a number of causes including heredity, food, drugs, urine pH, hypercalcemia and hyperoxaluria.[31]

2. **Uric acid stone:** It occurs from eating an animal protein-rich diet, which raises uric acid levels in the urine and affects patients who have gout gouty arthritis. This concentrated urine collects and hardens into kidney stones due to the presence of uric acid.[3] By the reduction of amount of meat in the diet, this type of stones can beprevented.[39]

3. **Struvite stone:** Outcomes from chronic urinary tract infection that raise pH urine; decomposition of crystalline material of magnesium ammonium phosphate. The development of such calculi is more prevalent in females as compared to males.

4. **Cystein stone:** A relatively rare type of stone caused by a rare genetic disorder. This leads to the passage of cystine via kidneys leading to development of calculi.[3]

5. **Calcium phosphate stone:** Over the past two decades, there has been a recorded rise in the occurrence of calcium phosphate (CaP) kidney stones, which reflects an epidemiological change and indicates a larger need for targeted research into the

production of such CaP stones. The pH of the urine is the most crucial factor in determining the outcome of the calcium kidney stone.Calcium oxalate stones (CaOx)are likelyto form in low pH environment whereas CaP stones form in a high pH environment.[29]

Additional risk factors includeinadequate hydration, obesity, and digestive disorders including "inflammatory bowel disease" (IBD), which impair the body's capacity to absorb fat. As a result, calcium clings to fat while leaving oxalate free to be transported to the kidney.[45]

Mechanism of stone formation

1. **Urinary supersaturation:** Various crystalloids and colloids can be found in urine, which is a highly saturated fluid. Due to the stone-forming inhibitors included in urine, precipitation does not occur under normal conditions. By the mechanism of nucleation, formation of a seed crystal can occur (inundation) or supersaturation of the urine can be a reason for this. It occurs when the urine contains some materials that can form calculi.

2. **Nucleation of crystals:** Nucleation describes the initial phase of a supersaturated solution's transition from aqueous phase to a rigid state. Stone salts are first combined in solution to form loose clusters, which may grow in size as more parts or clusters are added. The earliest crystals with a distinctive-lattice arrangements and that do not disintegrate are nuclei. Heterogeneous nucleation, which refers to the process, is how nuclei typically develop in urine on existing surfaces.

3. **Growth of crystals:** Every time a crystal core exceeds the threshold dimension and the comparative supersaturation settles over one, the total free enthalpy is lowered by adding new crystal constituents to the core. This procedure can be named as crystal growth. Crystal development can be considered as a requirement for calculi emergence and particle production. Crystal growth and aggregation play crucial role in each stage of stone production.

4. **Aggregation of crystals:** The result of this process is the formation of big particles from crystals in the solution. It is the most crucial stage in the production of stones. Although the growth of crystals is unquestionably a step in the formation of renal stones, since it takes some time for the renal ultrafiltrate to travel via kidney, the crystal won't be able to

develop big enough to block the renal tubules and get accumulated there by this process alone as the development process is sluggish. The crystal-foreign substances having many binding sections, like uromodulin or other large sized molecules, adhere to crystalline exteriors & behave like a type ofglue, promoting particle aggregation.

5. **Interconnection of Crystals and Cell:** Many of the intricate mechanisms governing crystal-cell interaction have yet to be discovered. Urinary supersaturation is a condition that leads to crystallisation. The generated crystals are then taken up by renal tubular epithelial cells after attaching to them.[13]

Clinical manifestation

Renal colic is the most typical reason of urolithiasis. It might also appear as a result of an infection or problems from nephrolithiasis therapy. A sudden acute paroxysmal pain on the affected side characterises renal colic. Usually, the pain wave does not end entirely before the next one starts. The distention of the ureter, which causes this visceral pain, is secondary to an obstruction of the ureter or the passage of stone.[36]

Occurrence of monogenic causes in paediatric patients with nephrolithiasis: Over the past few decades, the prevalence of paediatric nephrolithiasis has considerably grown. Furthermore, because of episodes of colic pain, the need for surgical intervention, and occasionally development to chronic kidney disease (CKD), this illness is linked to a significant morbidity.

Monogenic causes of nephrolithiasis have not yet been thoroughly researched in terms of their contribution. Mutational analysis is especially important in this group since paediatric patients are more likely to have a monogenic aetiology of disease. Furthermore, in early-onset nephrolithiasis, early discovery of illness causing mutations is crucial because genetic diagnosis enable precisely tailored therapy regimens that may stop recurring disease or the development of End Stage Renal Disease (ESRD).[46]

Primary Hyperthyroidism and Nephrolithiasis: Patients with primary hyperthyroidism experience stone development and passage symptoms that are identical to those of other forms of calcium induced nephrolithiasis. The early growth of crystals on the surfaces of the renal papillae happens during the earliest phase of stone formation, when the patients are

typically asymptomatic. Typically, the discomfort starts in the flank or lower anterior abdomen and gets worse over time.[47]

Although there are several contributing causes to nephrolithiasis, hypercalciuria is one of the main risk factors for stones. Nephrolithiasis is recognised to be at risk for primary hyperparathyroidism (PHPT) and 2-8% of patients with nephrolithiasis in published series also have concomitant PHPT. Hypercalciuria is typically thought to contribute to the pathogenesis of nephrolithiasis since renal calcium excretion is increased in PHPT, although the precise link between PHPT and nephrolithiasis is still partially understood.[48]

Nephrolithiasis in children: The condition known as urolithiasis used to be regarded as the bone of adulthood. Recently, a growing understanding of the significance of paediatric urolithiasis has emerged. Undoubtedly, children can develop into calculi. This is especially true in high-risk areas and in certain geographical areas. The identification of kids who are most at risk may enable early calculus detection or prevention based on a laboratory assessment of pathogenetic risk variables that are known to be crucial in the development of nephrolithiasis.[49]

Cardiovascular Disease and Nephrolithiasis: In western societies, nephrolithiasis is a reasonably common condition. Nephrolithiasis has been linked in epidemiological research to arterial hypertension, diabetes mellitus, and obesity. The significant prevalence of these co-morbidities in kidney stone formers (KSF), which are symptoms of the metabolic syndrome, suggests that intransigence of insulin is engaged in pathophysiology of kidney calculi. Diabetes and obesity both increase the risk of lithogenesis because they both increase the urinary excretion of substances that promote crystallisation and urine acidity, which leads to an increment in the possibility of CaOx lithogenesis. Diabetic patients have a greater risk of establishment of stones.

In a big prospective study, it was shown that people who were obese and who consumed a lot of fructose linked to the emergence of the metabolic syndrome in human had on increased chance of developing kidney stone.

Although there is some evidence that the risk factors for coronary heart disease are rising in kidney stone formation, no data are yet available to show that this elevated risk actually has a negative impact on clinical outcomes.[50]

Diabetes and Nephrolithiasis: Nephrolithiasis, specifically uric acid (UA) nephrolithiasis, is linked to an increase risk of type-2 diabetes. Low urine pH, a crucial component of UA crystallisation, is present in diabetic patients who develop uric stones. Such acidic urine appears to be produced as a result of the insulin resistance present in diabetes mellitus. The pathophysiology of primary uric acid nephrolithiasis seen in obese individuals with the metabolic syndrome also involves insulin resistance.[51]

Nephrolithiasis and Inborn metabolic diseases: A relatively uncommon disorder called nephrolithiasis linked with inborn metabolic diseases has some features in common, including early symptom start, familial history, related tubular dysfunction, bilateral, numerous, repetitive stones plus relationship including Anderson Carr progression. Diagnosis of these problems might result in deadly situations that can be due to incessant renal disease and dur to continues participation outside the kidney (extra renal), that may affect the fundamental confirmation (such as type1 primary hyperoxaluria, which require integrated kidney graft) and in such assemblance that affect (Lesch-nyhan syndrome that reserved in self-mutilation), phosphoribosyl pyrophosphate synthetase super-activity, that is linked with sub-normalities. Some ingrainedillnesses related to biotransformation including cystinuria, xanthine insufficiency, only manifest in patients as recurrent stone formation.[52]

Ethnomedicinal plants used in the Management and Treatment of nephrolithiasis

According to a well-known proverb, garden has the cure for every disease. The use of medicinal plants as affluent place of beneficial substances involved in management and therapy of numerous ailments is highly regarded around the world. Herbs have long been used by various civilizations throughout the world to treat a variety of diseases.[13]

As per the WHO has reported eighty percent of the inhabitants of world uses herbs to cure illnesses. However, it is known that between 20% and 30% of the medicines sold in the market today are made from natural sources.[14]

Since the dawn of humanity, when humans had access to other efficient therapeutic resources, people have used plants as medicines. Up until the present, this knowledge was communicated through myths, pictographs and different monographs.[14]

In underdeveloped nations, plants have long been important in traditional medicine as well as in local communities' history and cultural customs.[28] Around the world, numerous conventional medical systems offer a number of herbal anti-urolithic treatment.[33]

It is preferable to use medicinal plants that can prevent the creation of stones and effectively shatter those that are already there.[32]

There is a wide variety of medicinal plants in India. Since ancient times, thousands of different plants have been employed in traditional medicine to treat a wide range of illnesses. They are one of the key sources of medications that have been valued for their therapeutic benefits since ancient times. Medicinal plants collectively consist of roughly 8000 species and makeup about 50% of the higher flowering plants species in the world. Over many decades, a body of knowledge about therapeutic plants has developed based on various medical traditions, including Ayurveda, Unani, and siddha. The majority of the global population, particularly in the poorer nations, relies on the conventional medical system for a number of reasons.[42]

Serial No.	Scientific Name	Family	Segment used
1.	*Adiantum capillus-veneris*	Adiantaceae	Leaves
2.	*Adiantum venustum D. Don*	Adiantaceae	Whole Plant
3.	*Ageratum conyzoides L.*	Asteraceae	Whole Plant
4.	*Asparagus racemosus*	Liliaceae	Root
5.	*Bryophyllum Pinnatum*	Crassulaceae	Leaves
6.	*Begonia picta smith*	Begoniaceae	Leaves and Tubers
7.	*Bergenia ligulata*	Saxifragaceae	Rhizome
8.	*Cedrus deodara D. Don*	Pinaceae	Bark and Wood
9.	*Ceterach officinarum*	Aspleniaceae	Roots
10.	*Chenopodium album L.*	Chenopodiaceae	Leaves
11.	*Cynodon Dactylon L.*	Poaceae	Roots
12.	*Dioscorea Deltoidea wall.*	Dioscoreaceae	Tuber
13.	*Dryopteris Cochleata(Don.)Chr.*	Dryopteridaceae	Areal part
14.	*Duchesneaindica(Andr)Focke.*	Rosaceae	Whole plant
15.	*Galiumaparine L.*	Rubiaceae	Whole plant
16.	*Goodyerarepens L.*	Orchidaceae	Whole plant
17.	*Rubia cordifolia L.*	Rubiaceae	Whole plant
18.	*Smilax aspera L.*	Smilaceae	Roots
19.	*Tribulus terrestris*	Zygophyllales	Fruit
20.	*Urtica dioica L.*	Urticaceae	Roots
21.	*Phyllanthus Niruri*	Phyllanthaceae	Leaves
22.	*Ajugaiva*	Lamiaceae	aerial part
23.	*Ammodaucus leucotrichus*	Apiaceae	Fruits

24.	*Atriplexhalimus*	Chenopodiaceae	Leaves
25.	*Chamaerops humilis*	Arecaceae	Sheath
26.	*Erica arborea*	Ericaceae	leafed branch
27.	*Erica multiflora*	Ericaceae	leafed branch
28.	*Globulariaalypum*	Globulariaceae	flowers – Roots
29.	*Stipa tenacissima*	Poaceae	Leaves
30.	*Moringa oleifera Lam*	Moringaceae	Root wood
31.	*Tetraclinis articulata*	Cupressaceae	leafed branch
32.	*Plectranthus amboinicus Lour*	Lamiaceae	Leaves

The modern techniques for stone removal includes lithotripsy, shock wave therapy,surgical procedures, local calculus disruption utilising high power lasers and contemporary medications are some of the current treatments employed for kidney stones. These are extremely uncomfortable, painful and have a number of side effects and even after treatment, the chances of recurrence of calculus are really high. Sincethere is noappropriate medical treatment for such a stone issue, it is crucial to express interest in the use of traditional herbal medicines, which are considered to be relatively safe with no side effects. Additionally, it should be reasonably priced, easily accessible and cost effective.[15]

In patient populations that have been carefully chosen, metaphylaxis and preventative methods are beneficial at reducing expenses. The most economically effective surgical treatments for stone disease are flexible ureteroscopy and percutaneous nephrolithotomy (PCNL), with PCNL being used only for big and lower pole stones. Although difficult to calculate, time off work and other indirect expenditures are significant factors in the economics of nephrolithiasis.[34] There has been a sharp decrease in the use of medications as a result of increased awareness of the negative effects of chemical medications, the risksassociated with surgery, the high expense of care, and the potential of recurrent kidney stones[38]. Some undesirable side effects from the therapy includes bleeding, hypertension, tubular necrosis ,hence it is quite evident from the above stated facts that there is a need to investigate natural remedies for treating urinary stones. Additionally, it is advantageous for its efficiency, safety and excellence.[38]

The necessity for fundamental scientific research on the therapeutic plants employed in indigenous systems is urgently needed in the current situation. This is demonstrated by the rise in the quantity of papers from different researchers substantiating the efficacy claims of plants, as well as the sharp rise in the market share of plant-based goods.[43]

Phyllanthus niruri: It has been demonstrated that *Phyllanthus niruri* disrupts a number of steps of stone formation, lowering crystal aggregation, altering the structure and composition of the crystals, and changing how the crystals interact withtubular cells, resulting in a reduction in endocytosis. The clinically advantageous benefits of *Phyllanthus niruri* may be related to the relaxing of the ureter, which aids in the removal of calculi or the clearing of fragments after lithotripsy, or to a possible decrease in the excretion of urinary crystallisation promoters like calcium.[16]

Bryophyllumpinnatum: Bybuilding an in-vitro model, the antiurolithiatic activity of *Bryophyllumpinnatum*, also known as Panphuti, belonging to family Crassulaceae has been studied. Different *Bryophyllum pinnatum* crude extracts were assessed for their capacity to break up calcium oxalate and calcium phosphate kidney stones created and the outcomes were contrasted using cystone as reference.[15] Kalanchoe pinnata carries a variety of phytochemicals, including flavonoids, quercitrin, glycosides, carotenoids, saponin, kamferol, and alkaloids. It also has a significant ability to dissolve calcium oxalate, which is the most prevalent component in producing stones in urinary tract.[41]

Tribulus terrestris: Also called as Gokshura or Tribulus, is a member of *Zygophyllaceae* family. Tribulus terrestris roots and fruits are useful for treating kidney stones, impotence, and painful urination. Additionally, it demonstrates the antibacterial, anti-inflammatory and antifungal properties.[12]

Bergenia ligulata: In south Asia, primarily India and Pakistan, Berginia ligulata has been used for generations to treat a variety of illnesses. However, its diuretic and lithotropic effects are its most significant actions. Stones in the kidney and ureter, as well as dysuria and stumbling, all are treated with Berginia ligulata. Theantiurolithiatic potential of the rhizome of Berginia ligulata rhizome has been examined in few preliminary investigations.[17]

Nigella sativa: Antioxidant rich medicinal herbs are being used more frequently worldwide due to their efficacy, affordability and safety. The spice plant Nigella sativa is frequently utilised for both prevention and treatment of a number of diseases.[18]

Ceterach officinarum: Mainly used as a diuretic, this plant is found throughout Europe and its aqueous extract is believed to be used in the therapy of CaOx calculi. Repressive action can be seen on the growth of calcium oxalate monohydrate and aggregation respectively.[19]

Blumea balsamifera: Kidney stones can be treated with decoction made from the leaves of *Blumea balsamifera* which is said to have antilithogenic properties. There are numerous substances in Blumea balsamifera that may 3inhibit the formation of calcium oxalate monohydrate stones.[20]

Achyranthus aspera: For antilithiatic action, the ethanolic extract of *Achyranthus aspera* was tested. The addition of ethanolic extract of *Achyranthus aspera* leaves substantially lowers the increased urinary calcium and oxalate ion concentration in the urine, demonstrating the inhibitory action on stone formation. Magnesium is one of the crystallizationinhibitorandis also found in higher concentrations in the urine.[21]

Herniaria hirsute: Herniaria hirsute is a member of the Caryophyllaceae family. Various in-vitro, in-vivo studies were carried out. It reduces crystal size, and has a diuretic effect. Kidney stone crystal deposition is reduced when the plant's aqueous elicit is taken orally.[4]

Urtica dioica: Also known as stinging nettle, it is a member of Urticaceae family. This plant has a long history of effective therapeutic effects on urinary conditions, particularly kidney and urinary tract stones. Saponins, anthocyanins, flavonoids are some of its main bioactive phytochemicals. With the help of these phytoconstituents, crystal formation and calcium oxalate deposition may be prevented.[22]

Asparagus racemosus: Belongs to the liliaceae family. Asparagenin, sapogenin, asparagine, saponins, flavonoids, tannic acid and sitosterol are its chemical constituents. It is believed to be beneficial in the expulsion of stones from the urinary tract.[23]

Adiantum capillus-veneris: It is included in the class Polypodiopsida. Medicinally utilised segments are firm leaves, desiccated rootstock & rhizomes.[4]

Ageratum conyzoides: Ageratum conyzoides belongs to the family Asteraceae.Calcium oxalate may dissolve as a result of the action of tannins, triterpenes like botulin and flavonoids like kaempferol-3-rhamnogalactoside and kaempferol-3-rhamnoside. Ageratum conyzoide's leaf extract exhibit antiurolithiaticefficacy against the calcium oxalate type of renal stones, which is the most prevalent type of kidney stone.[56]

Chenopodium album: Chenopodium album belongs to the family *Amaranthaceae*. Its leaves have been used to treat kidney problems and stones in the urinary system for a long time. The

results of methanolic and aqueous extracts of Chenopodium album leaves support the plants historical use as an antilithiatic agent.[57]

DISCUSSION

In the current era there has been a significant change in the medical treatment of urolithiasis.Numerous chemical components including Saponins, Tannins, Alkaloids, Flavonoids, lactones, and Terpenoids, are responsible for various essential medicinal characteristics of plants.[24] TCM (Traditional Chinese medicine) texts(17,24-27) contain a wealth of herbal medications with antilithic properties that are utilized for treatment. In vitro models like nucleation, crystal aggregation, and crystal growth have been used to study some medications.[25] Since ancient times people have engaged in the immoral practice of using medicinal plants to maintain human health and treat a variety of illness. People learn from their experiences and experiments to improve the quality of their lives.[3]

Calcium oxalate kidney stones are the most typical kind of urolithiasis, a disease that affects people allover the world. Numerous traditional herbs with a variety of uses are found in folk medicine and are frequently used to treat urolithiasis. By preventing calcium oxalate crystals from aggregating, the current study aims to inhibit crystal growth. This research paves the way for future investigations into the discovery for novel phytochemicals for the treatment and or prevention of calcium oxalate urolithiasis.[53]

Since it has been found that only a small number of village elders are knownledgeable about medicinal plants, the current investigation is extremely useful in both preserving this important knowledge and advising the phytochemical screening of these plants in order to create novel drugs to treat nephrolithiasis.[3]

The vital function of eliminating toxins and extra fluid from our bodies in the form of urine is carried out by the kidneys, which are a vital component of our body. The unfavourable side effects of modern medicine have already drawn people's attention to natural remedies. Develop trust and faith in the safer indigenous system by proving its efficacy in treating various aliments in order to enhance acceptance and awareness among the population.[54]

A frequent urological condition called idiopathic calcium oxalate kidney stone development typically begins with interstitial or tubular calcium phosphate deposition within the renal papillae. These CaP deposits serve as a foundation for the development of stones through

continual deposition of mostly calcium oxalate crystals, once they are exposed to pelvic urine as Randall's plaques or plugs. Recurrence is frequent and the purpose of treatments is to get rid of the current stones and prevent the development of new ones. According to clinical investigations, the majority of herbal remedies have the diuretic properties and aid in the passing of at least tiny stones.[55]

CONCLUSION

Due to absence of effective therapies and higher recurrence rates, kidney stones have through-out the years become one of the major health concerns that affects human health globally. We have provided evidence in this review supporting the effectiveness of several medicinal herbs employed for management and anticipation of nephrolithiasis. As per the recent research, numerous invitro experiments have been done to determine how medicinal plants may affect nephrolithiasis development. There has been little human research on the effectiveness of treatment for nephrolithiasis. Further study and analysis are needed to confirm the effectiveness and safety of these ingredients in patients with nephrolithiasis through rigorous clinical trials.

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