



## TRADITIONAL HERBAL MEDICINES USED FOR RENAL CALCULI BY KATTUNAYAKAN TRIBALS OF SOUTH WAYANAD FOREST DIVISION, KERALA.

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### ABSTRACT

Human civilization is facing the problem of kidney stones since ancient ages. Although mortality rate is not so high, yet it affects the victim's quality of life. The patient suffers from intense pain and many other symptoms modifying his life style and affecting his socioeconomic status. Many drugs and invasive methods have also been developed for the treatment, but these are highly costly and unaffordable for poor and rural people and the rate of reoccurrence is also high. The use of medicinal plants is both affordable and effective in this respect. In this article, 35 medicinal plants used by Tribals and rural inhabitant of south wayanad forest divisions of Kerala state and their crucial information have been enumerated. The medicinal plants used by people are arranged alphabetically followed by Botanical name, Family, Voucher specimen number, Local name, Part used, Mode of preparation are discussed.

**Key words:** Ethnobotany, Kerala, Medicinal Plants, Renal calculi.

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### INTRODUCTION

Natural environment has been a source of medicinal agents for thousands of years, since healing with plants dates back probably to the evolution of *Homo sapiens*. Even to date, about 80% of the world's inhabitants rely mainly on traditional medicines for their primary health care, while medicinal plants continue to play an important role in the health care systems of the remaining 20%. Partly based on their use in traditional medicine, an impressive number of modern drugs have

also been isolated from natural plant species. Urinary tract and kidney stones ailments have affected human beings since antiquity. Ancient Vedic literature describes stones as Ashmari. The occurrence of these stones has been increasing in rural and urban. A large population of India suffers from urinary tract and kidney stones, formed due to deposition of calcium, phosphates and oxalates. The chemicals start accumulating over a nucleus, which ultimately takes the shape of a stone. These stones may persist for indefinite time, lead to secondary complications causing serious consequences to patient's life. It is very painful and a proper cure is very much needed to get rid of the problem (Misra and Kumar Ashwani 2000).

Stone formation is one of the painful urologic disorders that occur in approximately 12% of the global population and its re-occurrence rate in males is 70 -81%

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and 47-60% in female (Soundararajan *et al.*, 2006). It is assessed that at least 10% of the population in industrialized part of the world are suffering with the problem of urinary stone formation. The occurrence of the renal calculi is less in the southern part when compared with other parts (Rana Gopal Singh *et al.*, 2010). The rate of occurrence is three times higher in men than women, because of enhancing capacity of testosterone and inhibiting capacity of oestrogen in stone formation (Kalpana Devi *et al.*, 1993). It has been found that the formation of urinary calculi dates back not only to 4000 B.C in the tombs of Egyptian mummies also in graves of North American Indians from 1500 to 1000 B.C (Bahuguna *et al.*, 2009). Stone formation is also documented in the early Sanskrit documents during 3000 and 2000 B.C (Surendra *et al.*, 2011). The problem of stone formation is considered as a medical challenge due to its multifactorial etiology and high rate of recurrence (Rana Gopal Singh *et al.*, 2010). Stone formation is also caused due to imbalance between promoters and inhibitors. From ancient periods, a number of herbal medicines have been found with potential effect in treating the problem of renal calculi (Khan *et al.*, 2010).

Though the treatment of urinary tract and kidney stones has been revolutionized by the development of non-invasive methods of stone disruption but the patients always try to refrain from surgical procedures. Moreover, it also carries the factors like high cost, availability, side effects, etc.; the recurrence rate is also high (50-80%) (Zaidi *et al.*, 2006). As no suitable medical therapy is available for such stone disorders, it is imperative to search for some new or less known medicinal plants, which may be a potential source for new bioactive compounds of therapeutic value. Such exploration assumes tremendous significance when herbal medicine is gaining importance throughout the world. Of late, there has been a growing resurgence and revival of interest in indigenous systems of medicine and traditional herbal remedies, which are regarded as quite safe, with minimal or no side effects, cost effective, readily available and easily affordable. People living in interior and inaccessible remote rural areas have excellent knowledge about medicinal utility of the local flora. People in such areas of the district have been traditionally using indigenous folk remedies to cure various diseases for generations and passing on this knowledge orally. Because of prompt and positive effect of herbal treatment they have strong faith in their own folk medicinal preparations or crude formulations.

Kidney stones are easy to diagnose for those with a sudden onset of pain, blood in the urine and stones that show on x-ray. Studies have shown that 15% of those with a stone develop another within a year and 33% within 5 years. These rates can be halved by drinking more than 2 liters of fluid each day (Tyagi *et al.*, 2012).

The origins of the therapeutic use of herbal medicine can be traced back to China about 5000 years ago. The extracts of several plants have been used as therapeutic agents. Many drugs presently prescribed by physicians are either directly isolated from plants or are artificially modified versions of natural products. These medicines are safe and environment friendly. According to the WHO about 80% of the world's population relies on traditional medicine for their primary health. Herbalists and indigenous healers have used botanical medicines traditionally worldwide for the prevention and treatment of different pathologies. Clinical research has confirmed the efficacy of several plants for the treatment of kidney stones problems and their therapeutic effects.

## STUDY AREA

The Council's researchers of the Regional Research Institute of Unani Medicine, Chennai has conducted a multiday ethno-botanical survey tour programme at South Wayanad forest division, Wayanad district, Kerala State from December 2010 to September 2013 in various seasons. The ethno medicinal information was collected from the tribal and local peoples of the Meppadi, Kalpetta and Chedleth ranges of the study area used for cure kidney stones. The survey team visited some of the tribal colonies such as Soochipara, Parapanpara in Meppadi Range, Kuttianvayal, Suganthagiri, Ampa in Kalpetta Range and Padiri South in Chedleth Range were surveyed. During the study, the researchers interacted with the tribal and local peoples and recorded information on folk medicinal plants.

## Wayanad District

The wayanad district lies between north latitude 11° 27' and 15° 58' and east longitude 75° 47' and 70° 27'. It is bounded on the east by Nilgiris and Mysore districts of Tamil Nadu and Karnataka respectively, on the North by Coorg district of Karnataka, on the South by Malappuram and on the West by Kozhikode and Kannur district. The Western Ghats Mountains in the Wayanad are rich in flora and fauna located at a distance of 76 km from the sea shores of Kozhikode. The altitude varies from 700-2100mts above sea level. The name Wayanad is believed that have been derived from the word Vayalnadu meaning the land of paddy fields. As for the forest vegetation are concern evergreen, semi evergreen, shola, deciduous, and dry deciduous forests are distributed all over the district. Annual rainfall is about 3000 to 4000 mm.

## South Wayanad Forest Division

The South Wayanad forest division comprises of 3 forest ranges which is Kalpatta, Mepadi and Chedleth forest ranges. Particularly the forest areas Chambera, Attamalai and Manikunthmala in Mepadi range, Ladysmith, Bible land, and Padinarathra forest areas in

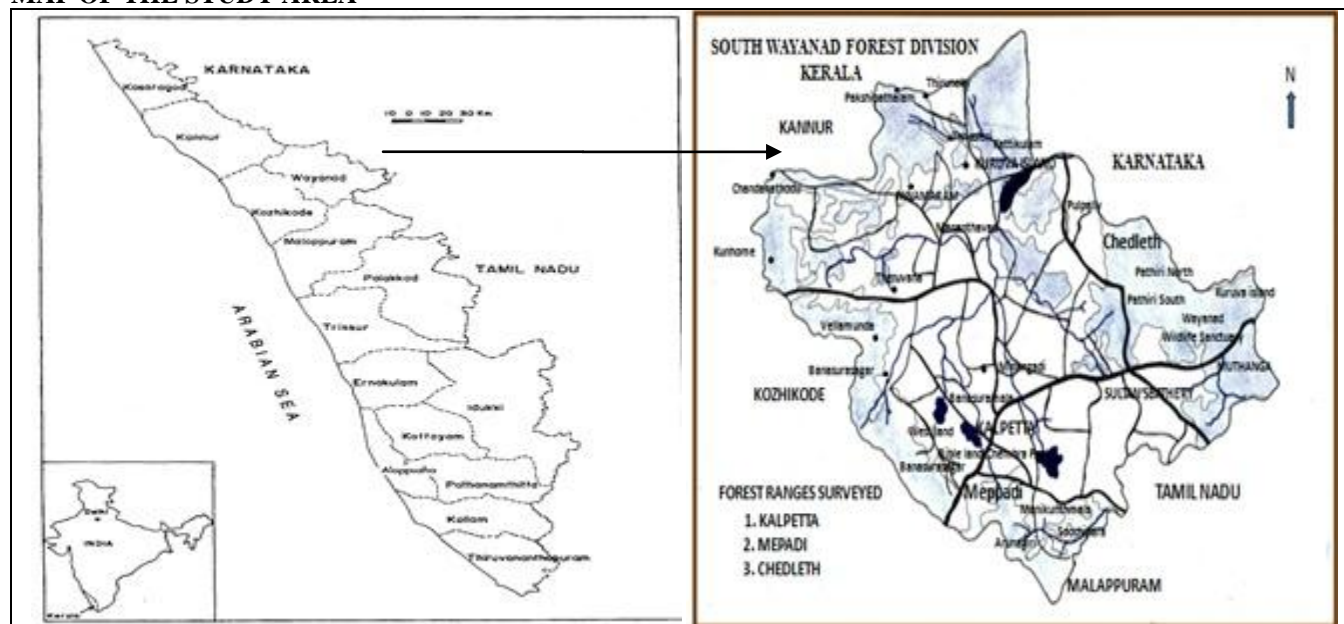
Kalpetta range, Pampra, Pathiri South, and Kuruva island forest areas in Chedleth range are rich in floristic diversity.

The forest areas such as Chemberapeak, Arunagiri, Attamala, Manikunthmala, Parapanpara, North, Padiri South forest areas in Chedleth Range were surveyed and carried out plant exploration activities. The tribal communities such as Irular, Kadas, Paniyas, Kattunayakans and Kuruchiars are settled in different part of the district. The survey team visited some of the tribal colonies such as Soochipara, Parapanpara in

Soochipara and Vengaishola forest areas in Meppadi Range, Lady's Smith, Meenmutti, Bibleland, Thandiudu, West land, Kuricharmala, Suganthagiri and Mandamala forest areas in Meppadi Range and Kuruva island, Padiri

Meppadi Range, Kuttianvayal, Suganthagiri, Ampa in Kalpetta Range and Padiri South in Chedleth Range were surveyed. During the study the researchers interacted with the tribal and local peoples, recorded information on folk medicinal plants.

## MAP OF THE STUDY AREA



## METHODOLOGY

A preliminary survey of Kattunayakan tribal villages in South Wayanad forest division revealed that local communities used herbal medicine for their healthcare extensively. Frequent field surveys were made in South Wayanad forest division, Wayanad district. Each area was visited twice in different seasons in 2010-2013. Ethnobotanical data (local names, part used, mode of preparation, medicinal uses) were collected through interviews and discussion with the tribal practitioners in and around the study area. Data were also collected through questionnaires in their local languages (Malayalam and Tamil). Informations were collected through interview with twenty five persons aged between 40-80, who had traditional knowledge of plants. In addition to the vernacular names, questions were also asked about each plant prescribed, such as part of the plant used, medical uses, detailed information about mode of preparation (i.e., decoction, paste, pills, powder and juice); from the usage either fresh or dried and mixtures of other plants used as ingredients were also collected. The claims were compared with available important

works on Indian ethnobotany and medicinal plants such as Jain (1991), Kirtikar and Basu (2001), Nadkarni (1954). The medicinal plants were identified (local names), photographed and sample specimens were collected for the preparation of herbarium documentation.

The collected plant species were identified taxonomically using the Flora of Presidency of Madras (Gamble, 1936) and the Flora of Tamil Nadu Carnatic (Matthew, 1983). The identified plant specimens were then confirmed through referral tour programme with herbaria of Botanical survey of India. The specimens were deposited in the herbarium of survey of medicinal plant unit, Regional Research Institute of Unani Medicine, Chennai. The tribal information is also kept in the same institute, voucher specimens along with other details are given in Table-1.

## Field survey and data collection

Field exploration was undertaken to collect information about tribes regarding their history, demography, life style, culture, art of living, socioeconomic background, food habits, major role in

conserving medicinal plants, local languages they use and traditional medicinal practices they are associated with. Further knowledge related to tribes were obtained from books, research papers, scientific magazines, Encyclopedias and internet sources of University library in Chennai and plant conservation centers at Wayanad, especially from Boys town at Mananthavady and M.S Swaminathan research foundation at Kalpetta Wayanad District.

The five major scheduled tribes of this area are Kurichia, Kuruma, Kattunaika, Paniya and Adiyar. They are distributed at different forest areas of the district. Basic information on the distribution of the selected five tribes was collected from Tribal development offices in Mananthavady, Bathery, Kalpetta and the Wayanad social service society office at Mananthavady. The survey team selected and visited some of the tribal colonies such as Soochipara, Parapanpara in Meppadi Range, Kuttianvayal, Suganthagiri, Ampa in Kalpetta Range and Padiri South in Chedleth Range were surveyed. Field trips were conducted from 2010 - 2013 among the tribal colonies of the South wayanad forest division. The main colonies, where tribal medical practitioners were residing were noted in the form of tables. The trips were organized every year in different seasons, and the team were always accompanied by Botanist, Unani Doctors and tribal promoter to identify the colonies and plants. The trips were organized every survey trip and each colony was visited for about 5-6 times. The location of Kurichia, Paniya and Kuruma colonies were found near their agricultural areas like paddy fields, coffee plantations etc. and Adiyar tribes were seen scattered in different areas. Kattunayakan are living in remote areas and seen interior to the forests and Hill tops. These Tribes were interviewed with standard questionnaire to collect the necessary information. The questionnaire was prepared with questions related to informant consensus factor, parts of plants used, method of application, therapeutic use, symptoms and causes of kidney stone diseases. The specimens were processed and preserved on herbarium sheets and identified with the help of flora of presidency of Madras (Gamble, 1936) and the flora of Tamil Nadu Carnatic (Matthew, 1983). The identified plants specimens were further confirmed through matching in the herbaria of botanical survey of India, Coimbatore. The specimens are deposited in the herbarium of survey of medicinal plants unit, Regional Research Institute of Unani Medicine, Chennai.

## RESULT AND DISCUSSION

Kidney stones (Renal calculi) and urinary tract infection is a one of the major disease affecting human beings since from ancient age. Vedic literature describes stones as Ashmari. The occurrence of stones has been increasing in rural and urban areas where there is problem of potable water and high temperature and also due to increase of

world population industrialized civilization and ozone depletion. South Wayanad Wild life forest division has a variety of medicinal plants which are used by Kattunayakan tribals for their primary health care. The present study identified tribal healers using 34 species of ethnomedicinal plants distributed in 34 genera belonging to 28 families to treat kidney stone diseases. The result of the survey presented in table-1, in which the plants are arranged alphabetically. The following ethnobotanical information were provided; Botanical names, Family name, Voucher specimen numbers, Local names, Part used, Mode of preparation, Route of administration, ethnomedicinal uses according to the informations collected. The mostly used plant parts among the tribals are leaves and fruit followed by root, seeds, whole plant, stem, bark, flowers, these are commonly occurring and medicinally important plants used to treat kidney stones. This is consistent with other general observations which have been reported earlier in relation to medicinal plants studies by the Indian system of medicines like Siddha, Ayurvedha and Unani (Kirtikar and Basu 1999., Anonymous, 1997., Asolkar *et al.*, 1992., Venkatesan *et al.*, 2018). Different types of preparation made from medicinally important plants include decoction, juice, powder, ash and plant extract. Drugs are prescribed either single or in a combination of more than one plant / parts of same or different plants to the people suffering from kidney stone diseases. In South Wayanad Wild life forest division, Wayanad district, the local herbal healers and elder people rich in traditional knowledge depend on the natural resources of the area. Most of them still consider traditional herbal knowledge as traditional secrets. But, through repeated contacts, and discussions, they shared their traditional herbal knowledge. Medicinal plants play an important role in providing knowledge to the researchers in the field of ethnobotany and ethnopharmacology. The observation of present study shows that traditional medicine plays a significant role in the life of tribal people.

Ethnomedicinal properties of the plants being used in the treatment of urinary tract and kidney stones is given mentioning plant names, families, local names and their medicinal uses, including plant parts used, method of recipe preparation, dose regimen and mode of administration as reported by the local people (Table 1). Occurrence of urinary tract and kidney stones is a common clinical disorder, which has afflicted mankind since ancient times. Urolithiasis is an entity, which has high morbidity and low mortality but having serious and significant socio-economical impact. The prevalence of urolithiasis is estimated to be 1-5%. However, its frequency varies with differences in dietary habits of different people, food and water contamination in different geographical areas and their level of development and environmental pollution, etc. The overall probability of forming stones differs in various

parts of the world. Its worldwide prevalence is estimated to be 2-5%, while it is 2-13% in developed in countries Zaidi et al., 2006.

Kidney stone formation is a complex process that results from a succession of several physico-chemical events including super saturation, nucleation, growth, aggregation, and retention within renal tubules (Khan SR. 1997). A survey of Vedic literature was conducted to elucidate pharma- cognostic aspects of herbal crude drugs of plant sources for the cure of urinary tract stones (Misra and Kumar Ashwani 2000). Fruit decoction of *Tribulus terrestris* Linn. or their powder is taken in the treatment of renal calculi by tribal people of Gwalior and Saurashtra (Bhat 2002, Singh and Khan 1990). Decoction of its root and leaf is used to cure kidney stones by local communities of Kanyakumari district of Tamil Nadu (Jeeva et al., 2006). Seeds of *Abutilon indicum* (Linn.) Sw. are employed by tribals of Saurashtra for stone problems (Bhat et al., 2002). Leaf and tender shoots decoction of *Aerva lanata* (Linn.) Juss. are taken for the treatment of

urinary bladder stones in Kanyakumari (Jeeva et al., 2006). Fruits of *Solanum surattense* Burm., are used in controlling calculi and stones in urinary bladder in Talaja taluka of Bhavnagar district of Gujarat and some other places in India (Bhat et al., 2002, Sharma 2003). Decoction of *Trianthema portulacastrum* Linn., is given in calculi treatment by rural and tribal people of Talaja taluka, Gujarat (Bhat et al., 2002)

Among all the plants surveyed, Stem Juice of *Musa paradisiaca* L., Fruit Powder of *Pedaliium murex* L., Fruit Decoction of *Rubus ellipticus* Sm., Decoction of Flower Style of *Zea mays* L. are most effective and most commonly used preparations for their anti-lithiatic properties by the local people of the area due to their prompt action and positive results. The study emphasizes the need for the critical scientific examination and proper clinical evaluation of these plant species for their therapeutic ingredients, which could be used against different stone disorders and diseases.

**Table 1. Traditional Herbal Medicines Used for The Treatment of Renal Calculi by Kattunayakan Tribals of South Wayanad Forest Division, Kerala.**

S. No	Botanical Name/ Family Name/ Voucher specimen No	Local name	Part used	Form	Mode of administration
1	<i>Abutilon hirtum</i> (Lam.) Sweet. / Malvaceae/ Voucher specimen No: RRIUM-CH:9769	Kattu Thuthi	Leaf	Juice	Leaf juice orally given twice daily for two weeks is efficacious for the treatment of urinary tract and kidney stones.
2	<i>Aegle marmelos</i> (L.) Corr./ Rutaceae/ Voucher specimen No: RRIUM-CH:10051	Vilvam	Leaf	Juice	1. Leaf Juice 60ml is taken in empty stomach for 7 days to reduce burning sensation during urination. 2. One spoon of Fruit pulp powder is taken orally with coconut milk for 14 days to Dissolve kidney stones. 3. Leaf powder of one spoon mixed in 100ml coconut milk. This preparation is taken twice a day to expel kidney stones.
3	<i>Aerva lanata</i> (L.) Juss. / Amaranthaceae/ Voucher specimen No: RRIUM-CH:10647	Poolaichedi	Whole plant	Decoction	Whole plant decoction, along with castor ( <i>Ricinus communis</i> Linn.) root and Nerunjill ( <i>Tribulus terrestris</i> Linn.) fruits is given twice a day for two weeks to cure stones. Root decoction is also used.
4	<i>Amaranthus spinosus</i> L. /Amaranthaceae / Voucher specimen No: RRIUM-CH:9898	Mullukerai	Whole plant	Juice	One cup of whole plant extract is orally taken for 3 days to treat burning sensation during urination and kidney stone. It also helps in the easy micturition.
5	<i>Argemone maxicana</i> L./ Papavaraceae / Voucher specimen No: RRIUM-CH: 8666	Bramathandu	Root	Powder	Dried root powder 10g is mixed with 50g of kandi sugar. From the preparation half spoon is

					dissolved in 1 cup of milk and orally taken for kidney stone.
6	<i>Biophytum sensitivum</i> (L.) DC./ Oxalidaceae / Voucher specimen No: RRIUM-CH:10176	Thendanazhi	Root Leaf	Decoction	1. Decoction of root is given 3 times a day for removal of kidney stone (Lithiasis). 2. Fresh leaves decoction is taken in morning and evening for kidney stone.
7	<i>Boerhaavia diffusa</i> L. / Nyctaginaceae / Voucher specimen No: RRIUM-CH:9958	Mukeratai	Root	Decoction	Root decoction is taken daily for one month to expel kidney stones.
8	<i>Bombax ceiba</i> L. / Bombacaceae / Voucher specimen No: RRIUM-CH:9755	Korangumanjal	Fruit, Bark	Powder	1. Dry fruit is used in the form of powder before breakfast daily for kidney stone. 2. Bark powder 5gms 3 times a day is useful for urination for kidney stone.
9	<i>Butea monosperma</i> (Lamk.) Taub./ Fabaceae / Voucher specimen No: RRIUM-CH:9673	Kattutheai	Leaf, Seed	Juice, Powder	1. Leaf juice is 100ml orally given for kidney stone. 2. Takes seed powder in one teaspoon with hot water after meals for kidney stone.
10	<i>Cassia fistula</i> L. / Caesalpiniaceae / Voucher specimen No: RRIUM-CH:9813	Sarakonnai	Fruit	Powder	Fruit powder 10g orally given with hot water in morning in empty stomach for kidney stone.
11	<i>Celastrus paniculata</i> Willd./ Celastraceae / Voucher specimen No: RRIUM-CH:11223	Valluluvai	Leaf	Juice	Fresh leaves crushed and mixed with curd, gives before breakfast no intake except water up to 3pm for kidney stone.
12	<i>Celosia argentea</i> L. / Amaranthaceae / Voucher specimen No: RRIUM-CH:10116	Sevalkondai	Root, Seed	Decoction, Powder	1. Root decoction 100ml is taken in morning for kidney stone. 2. Seed powder 10g orally given with hot water daily thrice for kidney stone.
13	<i>Coccinia grandis</i> (L.) Voigt/ Cucurbitaceae / Voucher specimen No: RRIUM-CH:9949	Kovai	Leaf	Juice	20 - 40 ml extract of leaves with one tea spoon <i>Cuminum cyminum</i> seeds and sugar make volume up to 200 ml owith <i>Phoenix sylvestris</i> toddy, given orally once a day for 5 days to dissolve kidney stone.
14	<i>Cynodon dactylon</i> L. / Poaceae / Voucher specimen No: RRIUM-CH:10142	Arugambull	Root	Powder	Root powder 10g made in to 100ml decoction orally given in empty stomach for kidney stone.
15	<i>Dolichous biflorus</i> L./ Fabaceae/ Voucher specimen No: RRIUM-CH:9424	Kollu	Seed	Soaked water	Seeds are soaked in water for overnight then the filtration is given orally in empty stomach for kidney stone.
16	<i>Gossypium herbaceum</i> L / Malvaceae / Voucher specimen No: RRIUM-CH:9439	Paruthi	Fruit	Extract	Unripped fruits roasted in burning ash thereafter, extract of fruit taken out and 50ml taken orally to treat kidney stones.

17	<i>Hemidesmus indicus</i> (L.) / Periplocaceae/ Voucher specimen No: RRIUM-CH:11233	Nannari	Root	Powder	1. Root powder 20g orally given with hot water daily thrice for 15 days to expel kidney stone.
18	<i>Mimosa pudica</i> L./ Mimosaceae/ Voucher specimen No: RRIUM-CH:10166	Thotalvadi	Leaf	Juice	1. Leaf juice is added in tea and used time to time for kidney stone. 2. Root powder 10g orally gives with hot water before breakfast for kidney stone.
19	<i>Mimusops elengi</i> L. / Sapotaceae / Voucher specimen No: RRIUM-CH:8651	Magilam	Bark	Decoction	Bark decoction 100 ml orally given in empty stomach for kidney stone.
20	<i>Moringa oleifera</i> Lam. / Moringaceae / Voucher specimen No: RRIUM-CH:9507	Murungai	Fruit	Powder	Fruit powder made into decoction and 200ml orally given in empty stomach for kidney stone.
21	<i>Musa paradisiaca</i> L. / Musaceae / Museum Specimen No RRIUM-CH: 53	Vazhai	Stem	Juice	Pseudo stem juice 200ml orally given in empty stomach for kidney stone.
22	<i>Ocimum tenuiflorum</i> L. /Lamiaceae/ Voucher specimen No: RRIUM-CH:	Thulasi	Whole plant	Ash	Entire plant should burn, ash of the plant mixed with water and given thrice a day.
23	<i>Pedaliium murex</i> L. / Pedaliaceae / Voucher specimen No: RRIUM-CH:9954	Yanainerunjil	Fruit	Powder	Fruit powder 100ml orally given in empty stomach in morning.
24	<i>Punica granatum</i> L. /Punciaceae/ Voucher specimen No: RRIUM-CH:10576	Mathulai	Fruit	Juice	Fruit juice 300ml is orally given before breakfast.
25	<i>Ricinus communis</i> L. / Euphorbiaceae / Voucher specimen No: RRIUM-CH:9872	Amanakku	Root	Decoction	Root decoction along with half a gram suku (dried and powdered rhizomes of <i>Zinziber officinale</i> Rosc.), one pinch of Perumkayam ( <i>Ferula asafoetida</i> Linn.) and common salt is taken twice daily for 7 days to treat kidney stones.
26	<i>Rubus ellipticus</i> Sm./ Rosaceae/ Voucher specimen No: RRIUM-CH:9192	Himalayan roseberry	Fruit	Decoction	Dried fruit made into decoction orally given for kidney stone.
27	<i>Sesamum indicum</i> L./ Pedaliaceae/ Voucher specimen No: RRIUM-CH:10623	Ellu	Leaf	Juice	Leaf juice 100ml orally given for 7 days to remove kidney stone.
28	<i>Solanum surattense</i> Burm/ Solanaceae/ Voucher specimen No: RRIUM-CH:9666	Kandankathiri	Root	Powder	Root powder along with Siru Katheri ( <i>Solanum indicum</i> Linn.) root powder is given with curd daily for two weeks to expel kidney stones.
29	<i>Syzygium cumini</i> (L.) Skeels/ Myrtaceae / Voucher specimen No: RRIUM-CH:10657	Naval	Fruit	Powder	Fruit powder taken 1 spoon with water twice a day for 15 days to dissolve kidney stone.
30	<i>Tephrosia purpurea</i> L. /Fabaceae/ Voucher specimen No: RRIUM-	Kollukaivelai	Root	Decoction	Root decoction 100ml orally given in empty stomach.

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31	<i>Tinospora cordifolia</i> (Willd.). Miers ex/ Menispermaceae / Voucher specimen No: RRIUM-CH:11238	Senthill	Stem	Extract	Crushed stems are kept in earthen pot with water undisturbed. After 3 days, supernatant was discarded and precipitate was dried. 5g of this is orally taken daily for 14 days to expel stones.
32	<i>Tribulus terrestris</i> L. / Zygophyllaceae/ Voucher specimen No: RRIUM-CH:9951	Nerunjil	Fruit	Decoction	1. Fruits and root decoction 100ml orally given thrice a day regularly to expelling kidney stones. 2. 5 gm powder of fruits with one teacup of milk taken orally twice a day for 2 weeks.
33	<i>Tridax procumbens</i> (L.) / Asteraceae/ Voucher specimen No: RRIUM-CH:10200	Aravamooku poondu	Leaf	Juice	Leaf juice 100 ml orally given in empty stomach for 15 days.
34	<i>Zea mays</i> L. / Poaceae/ Museum Specimen No RRIUM-CH: 48	Makasolam	Style of Flower	Decoction	100-200ml decoction of styles obtained from female inflorescence or immature cobs are given twice daily for 7 days to expel stones from kidney.

**Table 2. Pharmacological Evidences and action of the plants/parts on Urolithiasis**

S. No	Botanical Name	Kidney stone & related therapies practiced in folk medicine	Plant part, extracts and animal models used	Studied Kidney stone / related activity
1	<i>Aerva lanata</i> L.	Kidney stone, Urinary irritation	Whole plant, hyperoxaluria, calculi induced in rats using ethylene glycol	Selvam <i>et al.</i> , (2001)
2	<i>Bombax ceiba</i> L.	Kidney stone, Urinary irritation	Fruit, Ethanol extract in rat	Gadge and Jalalpure (2012)
3	<i>Boerhaavia diffusa</i> L.	Kidney stone, Urinary irritation		Pareta <i>et al.</i> , (2010)
4	<i>Cynodon dactylon</i> L.	Kidney stone, Urinary irritation	Root, Ethanol extract in rat	Khajavi Rad <i>et al.</i> , (2011)
5	<i>Mimosa pudica</i> L.	Swellings, Kidney stone, Urinary irritation	Whole plant, Ethanol extract in rat	Joyamma <i>et al.</i> , (1990)
6	<i>Mimusops elengi</i> L.	Antirolithiatic and antioxidant activity	Bark, Ethyl glycol extract in rat	Purnima <i>et al.</i> , 2010, Ashok <i>et al.</i> , 2010.
7	<i>Moringa oleifera</i> Lam.	Kidney stone,	Root-Wood, Ethyl glycol extract in rat	Ravindra <i>et al.</i> , 2006.
8	<i>Pedaliium murex</i> L.	Urolithiasis	Fruit Ethanol extract in male wistar albino rats	Ananta Teepa <i>et al.</i> , 2010.
9	<i>Solanum surattense</i> Burn.	Nephrolithiasis	Fruit Extract on Ethylene-Glycol in Rats	Patel <i>et al.</i> , 2012
10	<i>Tribulus terrestris</i> L.	Antirolithiatic activity	Fruits, Induced urolithiasis in rat	Anand <i>et al.</i> , 1994. Hariprasath <i>et al.</i> , 2013.
11	<i>Tridax procumbens</i> L.	Calcium oxalate urolithiasis	Plant, Ethyl glycol extract in rat	Sailaja <i>et al.</i> , 2011



12	<i>Zea mays</i> L.	Decoction of styles obtained from female	Inflorescence or immature cells.	Velazquez et al., 2009
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## CONCLUSION

During the period of the documentation it is observed that the tribal people of the district are shy and conservative in nature. They do not want to share their ancient traditional knowledge with other people. Moreover, the existing knowledge on traditional uses of medicinal plants are declining fast because of the lack of interest of young people to learn the traditional knowledge from the old tribal medical practitioner. The valuable and experienced knowledge on the medicinal uses of plants are also disappearing due to modernization, destruction of forests, urbanization, industrialization, etc. Scientific investigations through the evaluation of plants for their biological activity and isolation of active constituents responsible for their medicinal properties for Kidney stone disorders need to be carried out in various

pharmaceutical industries and National laboratories which will give a chance to develop new natural medicines.

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