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Ethnomedicinal plants used to treat Nephrolithiasis: A case study Pauri (PAURI Garhwal), Uttarakhand

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Abstract

Survey of temperate forest of Pauri, (Pauri Garhwal) was conducted to document the potential medicinal plants against nephrolithiasis in the present investigation. Nephrolithiasis is a condition marked by the presence of stone or infection caused by it in urinary system, which is recurrent issue and makes it one of the major health problems of world and at the same time challengeable disease for management and curing. Plants as an alternative source for its management are one of the brighter hope for curing this ailment. Present study revealed that 30 plants from 24 families were observed to have the potential of anti-nephrolithiasis property.

Keywords: Medicinal plant, Nephrolithiasis, Calculi, Pauri, Uttarakhand

1. Introduction

Nephrolithiasis, a condition refers to the formation of calculus in the kidney due to deposition of calcium oxalate or phosphate from urine, is one of the common but serious problem due to its recurrence since antiquity, if not managed properly ends with renal failure. Today 12 % of the global population suffering from the problem of nephrolithiasis with its recurrence rate higher in male (70-80%) than the female (47-60%)^[1]. Once a patient affected by renal stone he become susceptible of its recurrence, the recurrence rate of stone is approximately 10% within one year, 35% within five years, and 50% within 10 years^[2]. Calcium oxalate type of calculi is most common of all types, which are formed from oxalates in urine made by the body^[3]. About 75% of kidney stones are composed of oxalate crystals^[4]. Which is enhanced by certain special types of food which includes food with high level of oxalates (Spinach, nuts etc)^[5]. Where it combines with calcium to form calcium oxalate stones. The standard drugs used to prevent Nephrolithiasis are not effective in all cases, and having adverse effects not allowing one to use these drugs for a long period.

2. Type and Management of Nephrolithiasis

Nephrolithiasis occur when urine is highly concentrated and minerals in it forms compound with calcium to form crystals (stone). Generally there are four different types of calculi viz

- 1. Calcium oxalate stone:** one of the most common type of all renal stones, occurs in two different forms viz calcium oxalate and calcium phosphate. All calcium stones are radio-opaque, and calcium oxalate and calcium phosphate stones are black, grey, or white and small (1cm in diameter) dense and sharply circumscribed on radiographs.
- 2. Uric acid stone:** results due to intake of animal protein rich diet which increases uric acid in urine and peoples with gout or gouty arthritis. This concentrated urine with uric acid settles and forms crystals (stone) in kidney. Allopurinols are used to reduce uric acid synthesis^[2, 5].
- 3. Struvite stone:** result due to chronic urinary or kidney infection which elevates pH of urine; decomposition of crystalline substance of magnesium ammonium phosphate. Women's are likely to develop that type of stone than the male.
- 4. Cystein stone:** relatively uncommon type of calculus, arise due to rare genetic disorder, which results leaking cystine through the kidney into the urine, forming crystals (stone).

Food habits have very pronounced effect on calculi formation. Diets rich in animal protein, sodium and oxalate, enhance the chances of calculi formation. So the best way to prevent kidney stone is by increasing daily fluid intake and reducing salt in diet, drink plenty of water and take a vegetarian diet high in magnesium. Reduction of sodium seems to play bigger role in preventing stone than the animal protein^[5]. Persons suffering from calculi should drink at least 2-4 liters of water.

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Generally patient with nephrolithiasis manages with non-steroidal anti-inflammatory drugs (NSAID), pain killers until the condition becomes un-manageable. Then only open surgery, laparoscopy, extracorporeal shock wave lithotripsy (ESWL) etc. standard procedures in urology practices are applied. However, traumatic effect, chances of infection, acute renal injury, recurrence of Nephrolithiasis and high cost of these make people to move toward indigenous treatments to get rid of the problem [1, 3, 5, 7]. Phototherapy as an alternative source against Nephrolithiasis is the ray of hope for world's population due to its rare side effect better results and less cost. Use of medicinal plants can be traced back in vedic period. Rig veda, the oldest repository of human knowledge written about 4500-1600 B.C describe 99 medicinal plants. Yayur veda, listed 82 plants. Atharva veda, important among four, deals with 288 plants [6]. Plants as a source of treating calculi were mentioned in ancient Indian texts such as Charak Samhita, Sushruta Samhita etc. Pashanbheda is drug mentioned in these texts to cure calculi which probably disintegrates crystals in urinary track and helps to flow with urine. So in the present investigation an attempt has been made to document the traditional knowledge for treating nephrolithiasis by using plants from temperate forest of Pauri, (Pauri Garhwal).

3. Material and Method

The area of present study is located at latitude 30° 8'59" N and longitude 78° 49' 4" E in the central part of Garhwal Hills Pauri (Garhwal) at an elevation of 1750 meter A.M.S.L., and present work was carried out in between 1750-1950 meter A.M.S.L. Regular field visits were made during March-April and September-October 2014-2016. Collected plants were identified by using flora & with the help of vernacular names and available literature. In order to explore indigenous knowledge of villagers of Pauri, questionnaire on documented plants for nephrolithiasis was used. Total 30 households from different villages were interviewed during the study, of the 30 documented plants only 15 were used by villagers for Nephrolithiasis in there folk system of medicine.

4. Results

The present paper deals with the documentation of ethno-medicinal plants used by local inhabitants of different villages and used in indigenous practices in different parts of country. Total 30 plants from 24 families along with their part used, indigenous use were reported to have potential for curing Nephrolithiasis and other urinary problems. Out of 30 plants 15 plants were used by local inhabitants of Pauri.

Table: 1: Lists of plants used in Nephrolithiasis from temperate forest Pauri, Pauri (Garhwal)

S. No	Botanical name	Family	Part used	Use
1	<i>Adiantum capillus-veneris</i> L.	Adiantaceae	Leaves	Leaves are used in renal and gallstones, urinary infection and to promote menstruation [8].
2	<i>Adiantum venustum</i> D. Don	Adiantaceae	Whole plant	Decoction of rhizome & leaves given in renal and gall bladder stone [8].
3	<i>Ageratum conyzoides</i> L.	Asteraceae	Whole plant	Decoction of plant given in uterine hemorrhage. Leaf extract twice a day in case of renal calculi [2].
4	<i>Asparagus racemosus</i> Willd.	Liliaceae	Root	Roots are diuretic, Boiled decoction of the root with sugar is prescribed in urinary troubles due to stone [2].
5	<i>Berberis aristata</i> DC.	Berberidaceae	Leaves	The boiled decoction of the leaves is prescribed in urinary tract infection and kidney troubles [2].
6	<i>Begonia picta</i> Smith	Begoniaceae	Leave & tuber	Washed leaves are taken orally, Powder of dry tuber used in case of Renal calculi.
7	<i>Bergenia ciliata</i> (Haworth) Sterbn	Saxifragaceae	Tuber	Tuber of plant used to treat kidney and gall bladder stone [12].
8	<i>Cedrus deodara</i> D. Don.	Pinaceae	Bark and Wood	The decoction of wood used against urinary problems [6]. Diuretic given in urinary disorder [12].
9	<i>Centella asiatica</i> (L.) Urban.	Apiaceae	Whole plant	Plant Juice with sugarcane molasses are taken in urinary calculus [2]. Leucorrhoea [9].
10	<i>Chenopodium album</i> L.	Chenopodiaceae	Leaves	Cooked leaves are given in urinary trouble [2].
11	<i>Cynodon dactylon</i> L.	Poaceae	Roots	Root decoction with honey twice for three week to cure urolithiasis [10].
12	<i>Cyperus rotundus</i> L.	Cyperaceae	Whole plant	Herb is given in abdominal problem and fever, tuber having diuretic properties. The decoction of the plant is prescribed in urinary trouble [8].
13	<i>Dioscorea deltoidea</i> Wall.	Dioscoreaceae	Tuber	Juice of tuber given in genital problem [13].
14	<i>Dryopteris cochleata</i> (Don.) Chr.	Dryopteridaceae	Areal Part	Areal portion boils and decoction is used to cure gall and kidney stone [14].
15	<i>Duchesnea indica</i> (Andr.) Focke.	Rosaceae	Whole plant	Decoction of plants with sugar is used for treatment of stone case and other urinary infection [2].
16	<i>Equisetum debile</i> Roxb.	Equistaceae	Whole plant	Juce of plant, with 1 gm <i>Piper nigrum</i> L. twice a day for urinary as well as kidney calculi [10].
17	<i>Thalictrum foliolosum</i> DC.	Ranunculaceae	Roots	Roots are used as diuretic [6].

18	<i>Galium aparine</i> L.	Rubiaceae	Whole plant	Decoction of plant is diuretic ^[12] .
19	<i>Geranium nepalense</i> Sweet.	Geraniaceae	Whole plant	Plants are astringent and are mostly used against various renal disorders ^[12] .
20	<i>Goodyera repens</i> L.	Orchidaceae	Whole plant	Decoction of plant is given in kidney and menstruation problems ^[15, 19, 27]
21	<i>Hedychium coronarium</i> Koenig.	Zingiberaceae	Rhizome	Boiled extract of rhizome is given in urinary tract problems ^[2] .
22	<i>Ocimum basilicum</i> L.	Lamiaceae	Whole plant	Extract of whole plant is used in case of urinary infection and stone.
23	<i>Oxalis corniculata</i> L.	Oxalidaceae	Leaves	Boiled decoction of the leaves with a pinch of indigenous Manipuri salt helps in exiting and eliminating calculi/ stones ^[2] .
24	<i>Pyracantha crenulata</i> (D.Don) M. Roemer	Rosaceae	Leaves and Areal Parts	Increase diuresis and lowering of urinary conc. of stone forming constituents ^[21] .
25	<i>Rubia cordifolia</i> L.	Rubiaceae	Whole plant	Root decoction with water is given to cure urinary infection ^[24] . Decoction of whole plant is given in case of irregular menstruation.
26	<i>Rubus niveus</i> Thunb.	Rosaceae	Leaves and Roots	The decoction of the leaves is useful in urinary complaints, for relaxing uterus muscles ^[2] . Fresh root tips are used for curing excessive bleeding during menstrual cycle ^[24] .
27	<i>Smilax aspera</i> L.	Smilacaceae	Roots	Roots are Diuretic ^[11] .
28	<i>Taraxacum officinale</i> Weber.	Asteraceae	Leaves & Roots	Leaf extract is used against kidney complaints, Root are diuretic and used in chronic renal disorders ^[17] .
29	<i>Tridax procumbens</i> L.	Asteraceae	Leaves	Leaf paste is given in kidney stone ^[2] .
30	<i>Urtica dioica</i> L.	Urticaceae	Roots	Root extract is diuretic and given and also help in proper functioning of kidney ^[18] .

Table 2: Lists of plants used by Villagers of Pauri, Pauri (Garhwal), against Nephrolithiasis

S. No	Botanical Names	Family	Part use	Folk use
1	<i>Adiantum capillsveneris</i> L.	Adiantaceae	Leaves	Boil leaves of plant given in menstruation problem. Powder of leaves with luke water twice a day in case of renal calculus.
2	<i>Adiantum venustum</i> D. Don	Adiantaceae	Leaves	Powder of leaves with luke water twice a day.
3	<i>Begonia picta</i> Smith	Begoniaceae	Leaves and tuber	Young leaves decoction twice a day. Powder of tuber twice a day before meal.
4	<i>Berberis aristata</i> DC.	Berberidaceae	Roots	Root soaked in overnight and then drink water early in the morning.
5	<i>Bergenia ciliate</i> (Haworth) Sterbn	Saxifragaceae	Tuber	Powder of dry tuber (2-3 gm) with luke lime water early in the morning empty stomach.
6	<i>Chenopodium album</i> L.	Chenopodiaceae	Whole plant	Juice of plant is given in urinary problems
7	<i>Cynodon dactylon</i> L.	Poaceae	Whole plant	Decoction of whole plant is given in calculi.
8	<i>Dryopteris cochleata</i> (Don.) Chr.	Dryopteridaceae	Areal part	Vegetable of areal plant in case of calculi is beneficial.
9	<i>Equisetum debile</i> Roxb.	Equistaceae	Whole plant	Whole plant soaked overnight and filter water drink early in morning act as blood purifier, in case of calculi and other urinary problems.
10	<i>Hedychium coronarium</i> Koenig.	Zingiberaceae	Rhizome	Rhizome cut into small pieces and then boiled, filter boiled water is used in urinary problems.
11	<i>Ocimum basilicum</i> L.	Lamiaceae	Leaves	Leaves decoction is used in renal calculi
12	<i>Rubia cordifolia</i> L.	Rubiaceae	Areal part	Paste of aerial parts with water is used.
13	<i>Rubus niveus</i> Thunb.	Rosaceae	Fruit and seeds	Fruit and powder of dry seeds given in calculi.
14	<i>Taraxacum officinale</i> Weber.	Asteraceae	Whole plant	Decoction of leaves and roots given in renal stone. Half tea spoon powder of dry plant with water twice a day.
15	<i>Urtica dioica</i> L.	Urticaceae	Leaves	Leaves boiled used as vegetable having diuretic properties, infusion of leaf and seed given in calculi.

5. Conclusion

Use of medicinal plant for maintenance of human health and treating a number of different ailments, practiced since time immemorial which people learn with their experiences and experiments to make their life comfortable. India, the land of Ayurveda and number of other indigenous system of medicine use medicinal plants as a primary source to eliminate the health problems. The oldest Hindu scriptures Rig veda mentioned 99 medicinal plants, which were used in different health issues and in religious ceremonies. In the present investigation an attempt has been made to document the

ethno-medicinal plants from temperate forest of Pauri Garhwal that were used against nephrolithiasis. Total 30 plants were reported to use in Nephrolithiasis, of which 15 plants are used by the inhabitants of different villagers of Pauri. It has been observed that the knowledge of medicinal plants is restricted to few elder people of villages, hence present investigation is use full to document such valuable knowledge and at the same time recommending the phytochemical screening of these plants so as to prepare some novel drug to cure nephrolithiasis.

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