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Traditional phytoremedies used to treat urolithiasis in Pauri (Garhwal) Uttarakhand India

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Abstract
Urolithiasis, a chronic recurrent problem marked by the presence of calculi in the urinary system affecting all around the world's population irrespect of gender and the use of phytoceramides as a curing weapon is in practice against urolithiasis since aeon. The present study attempts to enumerate ethnomedicinal notes on such plants from the interior areas of Pauri district of Uttarakhand, India, which are passed from generation to generation as an important medica heritage orally, but with the onslaught of modernization know restricted to some of the elderly persons of the communities and faces threat to disappear with them. Ethnomedicinal information was gathered for urolithiasis by direct interview. In present investigation a total 45 plants of 33 families were reported to be use by villager for curing urolithiasis. This valuable documentation of ethnomedicinal notes may use as alternative to develop some more reliable medicine for the proper management of the ailament and help to improve the life of humankind. Plant based phytoremedies are still in used as first line of treatment for urolithiasis in the era of modernization in present study areas. The study revealed of all plants used in ethnomedicinal preparations, some 11 are also used in standard classified system Ayurveda in preparations such as Neeri and Cyston. Further, pharmacological studies on plants other then standard 11 plant may provide some drug of interest of the treatment to chronic and recurrent problems.

Keywords: ethnomedicine, medicinal plants, urolithiasis, Pauri Garhwal

Introduction
Pauri part of Indian Himalayan Region (IHR) is one of the 13 districts of Uttarakhand and because of its unique geography and diverse climatic conditions harbors the highest number of plant species known for medicinal properties among all Indian Himalayan states [1]. Further, Indian Himalaya region accommodates 46,96,1740 population along with different tribal communities harboring the treasure of the folk knowledge which passed from generation to generation as an important heritage and supports over 1738 medicinal plants [2-5]. India harbor the treasure of folk knowledge. Medicine is next to the three basic needs required by human in order to survive or make their life comfortable. Use of herbal medicine as old as human race itself. Urolithiasis, a condition refers to the formation of calculus in urinary system (calculus in kidney, bladder or urethra) due to deposition of calcium oxalate or phosphate (calcium oxalate type stone), increased uric acid (uric acid type of stone), due to chronic urinary, UTI or renal infection which results in accumulation of crystalline substance of magnesium ammonium phosphate (struvite type of stone) or due to rare genetic disorder (cystein type of stone). Among all calcium oxalate type of calculus oxalate type is most common [6, 7]. Presence of stone in the urinary system results in pain in abdomen and the pain is so severe that it may compare with the pain at the time of labour. Further, calculi forming components can be easily examine in the urine sample of patient suffering of the ailament, moreover in rare cases blood may also come with urine. In India, approximately [5-7] million patients suffer from stone disease. Off the all renal calculi (nephrolithiasis) is most and serious problem affecting 12% of the global population with higher recurrence rate (70-80%) in male then (47-60%) in female. Urolithiasis shows its strong association with some of metabolic syndrome such as Diabetic mellitus, gout, obesity and hypertension [11-14]. Person suffering from these disease have higher the chances of calculi formation then the normal persons.

Material and Methods
The present investigation was carried out in interior villages of Pauri during 2015-17. Ethnomedicinal information was gathered by direct interview in order to collect indigenous knowledge of villagers. Plants were identified by using local names, available literature and
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flora of Garhwal[9]. Total 50 households form different villages were interviewed during the study.

Results and Discussion

Urolithiasis is one of the chronic diseases affecting the population since aeon. The use of medicinal plants as a weapon against the ailament is in practice dates back down the civilization, which passed through one generation to other as an important heritage. The present study explored 45 plant species employed as anti-urolithiasis plants by the local of the interior communities of Pauri Garhwal in different formulation. Total 39 angiosperms, 1 gymnosperms and 5 pteridophyte of medicinal plant belong to 33 families 44 genera were recorded to have anti urolithiasis potential. Present study revealed that leaves were the preferred part of the different plant for treating calculi and used in 29% of cases among all and bark & flower were among least used plant parts contributing 2% each in the different formulations. Further, among different life forms herbs contributing 71% of the total plant and least contribution was recorded for climber 2%. Asteraceae was the dominant family according to the contribution in different formulation recorded during the survey of the different villages of the Pauri Garhwal. Further, it was reported that the different parts of the same plant used in different formulation by the different communities to curing ailament. Present study further co-relates the beliefs of the local with the codified system of medicines and it was found that off the total 45 plants some 11 plants were used in different codified system (Ayurveda, Homeopathy etc.) to cure calculi. Peoples in the study area's generally used plants in two common forms i.e., powder of dry part and decoction of the plant so as to make their availability thought the year.

Synopsis of contribution number percentage of families, genera and species of different group.

Group	Families		Genera		Species	
	Number	Percentage	Number	Percentage	Number	Percentage
Pteridophyte	04	12.12	04	09.09	05	11.11
Gymnosperm	01	03.03	01	02.27	01	02.22
Angiosperm	28	84.85	39	88.63	39	86.67

S. No	Botanical Names	Family	Life forms	Part use	Folk use
1	*Abutilon indicum*	Malvaceae	S	Leaf and Root	Decoction of leaves and root is used to cure urinary problems and also used as diuretic.
2	*Achyranthes asper* L.	Amaranthaceae	H	Leaf and Seeds	Leaf and seeds are used as litholytic to cure urolithiasis.
3	*Adiantum capillus-veneris* L.	Adiantaceae	H	Leaf	Leaves have litholytic properties and also given in menstruation problems. Leaves powder with luke water twice a day is beneficial in calculus
4	*Adiantum venustum* D. Don	Adiantaceae	H	Leaf	Leaves powder with luke water twice a day.
5	*Artemisia arborescens* L.	Asteraceae	H	Whole plant	Decoction of plant is litholytic in properties and also used as diuretic.
6	*Asparagus racemosus* Willd.	Liliaceae	S	Root	Decoction of the roots alone with sugar is prescribed in urinary troubles due to stone.
7	*Begonia picta* Smith	Begoniaceae	H	Leaf and tuber	Both leaves and tuber of the plant have litholytic properties and used to cure urolithiasis. Leaves decoction given twice a day after meal. Powder of tuber twice a day before meal is very beneficial in nephrolithiasis.
8	*Berberis aristata* DC.	Berberidaceae	S	Roots	Crushed roots were allowed to secrete its phytochemicals in water for overnight and then consume the same twice a day for 45 days.
9	*Bergenia ciliata* (Haworth) Sterbn	Saxifragaceae	H	Tuber	Tuber of the plant having litholytic properties. One tea spoon powder of tuber with luke lime water early in the morning empty stomach is very beneficial in curing nephrolithiasis.
10	*Boerhavia diffusa* L.	Nyctaginaceae	H	Whole plant	Decoction of whole plant is very useful in all urinary troubles. Most effective in case of uric acid stone. Decoction is also used to cure chronic renal problems.
11	*Butea monosperma* (Lam.) Taubert	Fabaceae	T	Flower	Flowers are diuretic and used to get relief in case of burning sensation during passage of urine due to calculi.
12	*Cedrus deodara* D. Don.	Pinaceae	T	Bark and Wood	The decoction of wood is diuretic in property and used against urinary problems.
13	*Chenopodium album* L.	Chenopodiaceae	H	Whole plant	Extract of plant is diuretic and used to cure urinary problems caused by renal calculi.
14	*Cichorium intybus* L.	Asteraceae	H	Leaf	Leaf extract is used in kidney troubles.
15	*Coriandrum sativum* L.	Apiaceae	H	Whole plant	Infusion of whole plant and decoction of seed used as diuretic and other urinary problems.
16	*Cucumis hardwickii* Royle	Cucurbitaceae	H	Seed	Seeds given in urinary problem and used mainly as diuretic.
17	*Cynodon dactylon* L.	Poaceae	H	Whole plant	Decoction of whole plant is given in calculi.
18	*Cyperus scariosus* L.	Cyperaceae	H	Rhizome	Rhizome of the plant is used as diuretic and litholytic.
19	*Didymocarpus pedicellatus* R.Br.	Gesneriaceae	H	Leaf and Root	Leaves are litholytic in properties and extract of leaves used to cure calculi, paste of leaves with luke water also reported to cure stone especially when stone is present in kidney. Root of plants along with leafs are used when stone is reduced in size and comes out in bladder.
20	*Dryopteris cochleata* (Don.) Chr.	Dryopteridaceae	H	Areal Part	Areal portion boils and decoction is used to cure gall and kidney stone.
21	*Duchesnea indica* Andrews	Rosaceae	H	Leaf	Extract of leaves is diuretic and also used to cure leucorrhea.
22	*Echinops cornigerus* D.C	Asteraceae	H	Root	Decoction of root is given in urinary problems mainly caused by urolithiasis.
23	*Equisetum debile* Roxb.	Equisetaceae	H	Whole plant	Plant cut into small parts then soaked overnight in water and filtrate consumed early in the morning before meal in urinary problem and renal infections.
24	*Flacourtia jangomas* (Lour)	Flacourtiaceae	T	Fruit	Decoction of fruit is given as diuretic in calculi problems.
25	*Geranium nepalense* Sweet	Geraniaceae	H	Whole plant	Decoction and infusion of plant is used in both nephrolithiasis and other chronic renal problems.
26	*Hedychium coronarium Koenig*	Zingiberaceae	H	Rhizome	Decoction of Rhizome used in urinary problems.
27	*Micromeria biflora* (Buch.-Ham. ex D. Don) Benth.	Lamiaceae	H	Whole plant	Plant decoction as diuretic and used in urolithiasis.
28	*Mimosa pudica* L.	Mimosaceae	S	Root	Root used to cure urine related problem generally due to calculus.
29	*Ocimum basilicum* L.	Lamiaceae	H	Leaf	Leaves decoction is used in renal calculi
30	*Oxalis corniculata L.*	Oxalidaceae	H	Leaf	Decoction of leaves used to cure urinary troblus due to calculus.

31	*Plantago major* L.	Plantaginaceae	H	Whole plant	Decoction of leaves and Infusion of whole plant used to treat renal calculi especially formed due to increased uric acid.
32	*Pyracantha crenulata* (D. Don) M. Roemer	Rosaceae	S	Fruit	Powder of dry fruit is litholytic in property and used to cure calculi.
33	*Rubia cordifolia* L.	Rubiaceae	H	Areal part	Plants aerial part is used to cure urolithiasis.
34	*Rubus niveus* Thunb.	Rosaceae	S	Fruit and Seeds	Fruit and powder of seeds of the plant is used to cure calculi.
35	*Sida acuta* Burn	Malvaceae	H	Root	Decoction of leaves is litholytic and used to cure urinary problem caused by calculus.
36	*Solanum nigrum* L.	Solanaceae	S	Leaf	Decoction of leaves is used as diuretic. Paste of leaves in very small quantity with luke water is used to treat calculi generally uric acid stone.
37	*Solidago virgaurea* L	Asteraceae	H	Leaf	Extract of leaves is given in chronic renal problems caused by calculi such as hydronephrosis and also used as diuretic.
38	*Taraxacum officinale* Weber.	Asteraceae	H	Leaves & Roots	Leaf extract is used against kidney complaints, Root are diuretic and used in chronic renal disorders.
39	*Thalictrum foliolosum* DC.	Ranunculaceae	H	Roots	Roots are used as diuretic.
40	*Trigonella foenum-graecum* L.	Fabaceae	H	Seeds	Seeds of the plant having diuretic property and also used to cure calcium based stone.
41	*Uraria picta* Jacquin	Fabaceae	H	Root	Root of the plant is also used as one of the ingredients of Dasmularisht and also used to cure chronic renal infection or to recover kidney after calculus caused infection.
42	*Urtica dioica* L.	Urticaceae	S	Leaf	Vegetable of leaves in used as diuretic. Infusion prepared from leaves is used to cure calculi.
43	*Valeriana hardwickii* Wallich in Roxb.	Valerianaceae	H	Root	Decoction of roots used in urinary problem and have litholytic property.
44	*Vitis vinifera* L.	Vitaceae	C	Leaf	Extract of leaves along with young twigs given as diuretic.
45	*Xanthium strumarium* L.	Asteraceae	S	Roots	Infusion of the roots twice a day used as diuretic & litholytic for curing calculi as well as other renal problems.

Plants used in Codified system of medicine

S. No	Botanical name	Family	Codified system
1	*Achyranthes asper* L.	Amaranthaceae	AYUSH
2	*Begonia picta* Smith	Begoniaceae	AYUSH
3	*Berberis aristata* DC.	Berberidaceae	AYUSH
4	*Bergenia ciliate* (Haworth) Sterbn	Saxifragaceae	AYUSH
5	*Boerhavia diffusa* L.	Nyctaginaceae	AYUSH
6	*Butea monospermum* (Lam.) Taubert	Fabaceae	AYUSH
7	*Cyperus scariosus* L.	Cyperaceae	AYUSH
8	*Didymocarpus pedicellatus* R.Br.	Gesneriaceae	AYUSH
9	*Mimosa pudica* L.	Mimosaceae	AYUSH
10	*Rubia cordifolia* L.	Rubiaceae	AYUSH
11	*Solanum nigrum* L.	Solanaceae	AYUSH

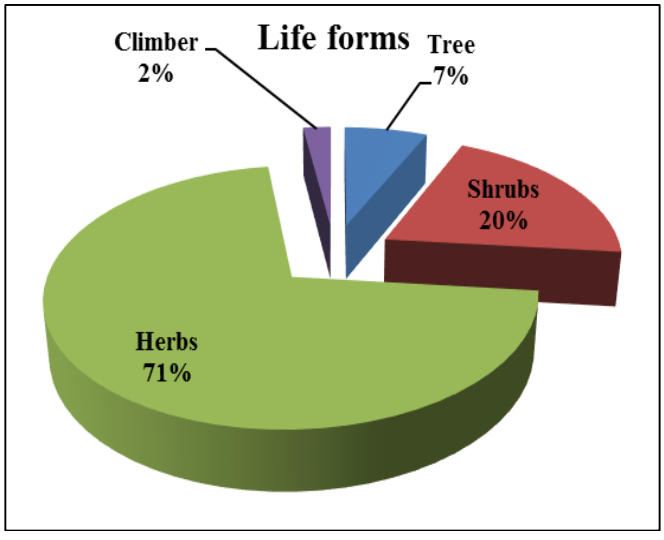

Fig 1: Life forms of different plant used in urolithiasis.

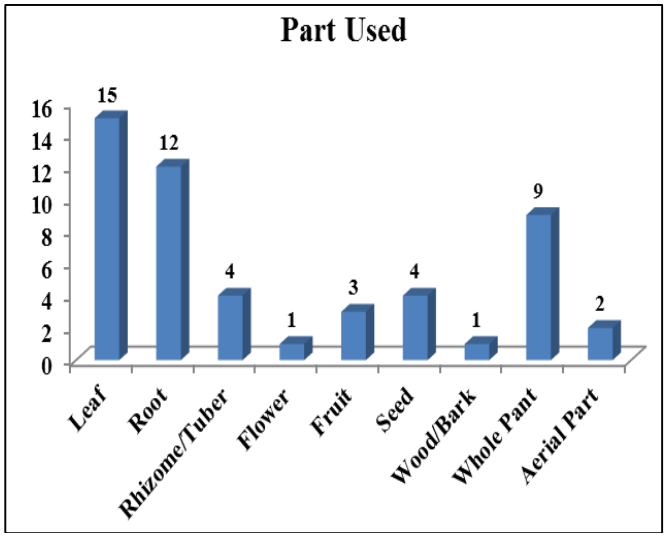

Fig 2: Different parts of the plant used in urolithiasis

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