

## Medicinal plants of Muzaffarnagar district used in treatment of urinary tract and kidney stones

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A floristic survey of ethnomedicinal plants was conducted at Muzaffarnagar district of Uttar Pradesh to assess the potentiality of plant resources. The study revealed that 15 plant species belonging to 13 families are used as anti-urolithiatic agents in local remedies. The information on medicinal uses is based on the exhaustive interviews with local healers and herbalists, practicing traditional system of medicine. Details of the plants, parts used, method of preparation, dosage and mode of administration have been reported. *Equisetum debile* Roxb. and *Gomphrena celosioides* Mart. are most effective and commonly used in treatment of urinary tract and kidney stones. These may prove precious potential source of bioactive compounds of therapeutic value against uro- and nephro-lithiasis and hence need further critical scientific testing, phytochemical examination and clinical evaluation for the purpose.

**Keywords:** Medicinal plants, Traditional medicine, Ethnomedicine, Kidney stone, Urolithiasis, Urinary tract stone, Calculi, Uttar Pradesh

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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 societies<sup>1-2</sup>. 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<sup>1</sup>. 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%)<sup>2</sup>. 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<sup>3-7</sup>. 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<sup>3-10</sup>. 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<sup>6,11</sup>.

Muzaffarnagar district lies in the extreme Northwest of Uttar Pradesh (UP) in the semi-arid region of upper Ganga-Yamuna *doab*. It is situated between the North latitudes  $-29^{\circ}11'$  to  $29^{\circ}43'$  and East longitudes  $77^{\circ}04'$  to  $78^{\circ}77'$ , bounded by rivers-Ganges and Yamuna in East and West, respectively. District Bijnor in UP, and Panipat and Karnal districts

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of Haryana lie in the East and West sides, respectively, across Ganga and Yamuna. Its northern border is shared by district Saharanpur of UP and Hardwar of Uttarakhand, while southern border by district Meerut of UP (Fig. 1). The district covers an area of 4,008 sq km with maximum length and width of 98 km and 58 km (average 84 km and 50 km), respectively. The slope of the district is from North to South. It is traversed by 4 small rivers, Katha, Krishna, Hindon and Kali, respectively from West to East, flowing almost parallel (Fig. 2). The district may generally be described as an alluvial plain consisting of 3 main geographical tracts – *Khadar*, *Bangar* and *Bhood* zone. The riverain khadar zone consists of rural countryside having many small human settlements and tiny hamlets in interior areas with poor connectivity. The total population of the district according to 2001 census is 35,41,952; of which 26,38,123 (74.48%) live in 1,027 villages<sup>12</sup>. Due to a large number of villages and huge rural population with rich tradition of utilization of plants for medicinal uses, the district constitutes a suitable and significant area for ethnobotanical studies.

Extensive floristic studies of the district have been carried out earlier<sup>13-15</sup>. Due to its very rich and diverse flora, with a majority of the same being used in traditional folk medicine, there is immense scope for their potential commercial use as well. However studies relating to their ethnobotany have not been attempted yet and thus there is a complete lack of information about their traditional usage. The paper attempts to present briefly the information about some of the plants being used in this area for their anti-urrolithiatic, litholytic and litho-expulsive properties.

### Methodology

The study was conducted as per prescribed standard methodology of ethnobotanical studies<sup>16-18</sup>. Frequent field visits were regularly conducted throughout the year in the *khadar* areas of the district. The plants were collected with the help of herdsmen, farmers and other local people. The information about ethnomedicinal uses, local names of plants, plant parts used, formulation and preparation of recipes, dose regimen, duration and mode of administration were sought from local healers and herbalists practising traditional system of medicine more specifically, the holymen, priests, *hakims vaidyas*, *ojhas*, *bhagats*, etc. Besides this village headmen, aged and experienced elderly knowledgeable men and women, and other rural folks were also consulted. The collected plants

were properly preserved and correctly identified with the help of local and regional florasin consultation with herbaria of FRI, Dehradun and BSI Northern circle, Dehradun<sup>15,19-22</sup>. Herbarium sheets were maintained in the herbarium of the Botany Department of CCR (PG) College, Muzaffarnagar for record and further reference.

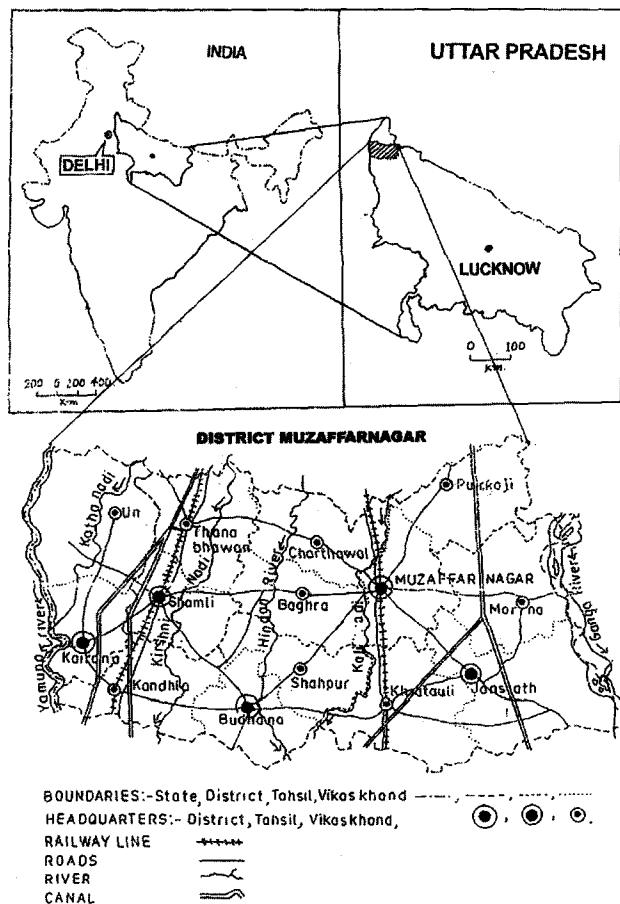


Fig. 1—Location map of the study area

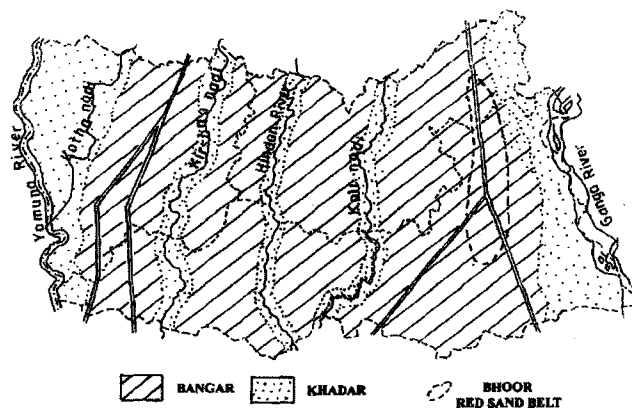


Fig. 2—Physiographic condition of the study area

## Results and discussion

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 countries<sup>2</sup>.

During ethnobotanical survey of district Muzaffarnagar, 15 plant species belonging to 13 families were recorded as effective remedies used by local people to treat and cure stone ailments of urinary tract and kidney. These crude drug preparations inhibit further stone formation and their enlargement, dissolve or break the calculi and stones, expel them

Table 1—Medicinal plants used in treatment of urinary tract and kidney stones

Plant name/family/ local name	Mode of intake and use
<i>Abutilon indicum</i> (Linn.) Sweet (Malvaceae), <i>Kanghi</i>	Leaf juice taken twice daily for two weeks is efficacious for the treatment of urinary tract and kidney stones.
<i>Aerva lanata</i> (Linn.) Juss. (Amaranthaceae), <i>Chaya</i>	Whole plant decoction of <i>Chaya</i> , along with castor ( <i>Ricinus communis</i> Linn.) root and <i>Gokhuru</i> ( <i>Tribulus terrestris</i> Linn.) fruits is given twice a day for two weeks to cure stones. Root decoction is also used.
<i>Boerhaavia diffusa</i> Linn. (Nyctaginaceae), <i>Bishkapra</i> , <i>Punarnava</i>	Root decoction is taken daily for one month to expel kidney stones.
<i>Bryophyllum pinnatum</i> (Lamk.) Oken. (Crassulaceae), <i>Patharchata</i> , <i>Ajuba</i> , <i>Ghavyatta</i> , <i>Parnbeej</i>	Fresh leaf juice along with 2-3 <i>Kalimirch</i> ( <i>Piper nigrum</i> Linn.) powder is taken twice a day for 15 days to expel stones.
<i>Crataeva nurvala</i> Buch-Ham. (Capparaceae), <i>Barna</i> , <i>Varuna</i>	Bark decoction twice daily for seven days is given in urinary tract infection (UTI) and for removal of stones from urinary tract.
<i>Cynodon dactylon</i> (Linn.) Persoon (Poaceae), <i>Doobghas</i> , <i>Doobra</i> , <i>Hari Doob</i>	Root decoction is given with honey or <i>misri</i> (clarified and crystalised sugar) twice daily for 3 weeks to cure urolithiasis.
<i>Daucus carota</i> Linn. (Apiaceae), <i>Gajar</i>	One glass <i>gajar</i> juice is taken regularly for a fortnight to remove stones from urinary bladder and kidney.
<i>Equisetum debile</i> Roxb. (Equisetaceae), <i>Jode tode ki ghas</i>	Whole plant juice is given along with 1 gm <i>Piper nigrum</i> Linn. twice a day for 7 days for removal of both urinary tract as well as kidney stones.
<i>Gomphrena celosioides</i> Martius (Amaranthaceae), <i>Kasia</i>	Whole plant juice along with 4 <i>Piper nigrum</i> Linn. and lemon juice twice a day is taken for 10 days to cure urolithiasis.
<i>Musa balbisiana</i> Colla. (Musaceae), <i>Kela</i>	Decoction of <i>Musa</i> roots and <i>gulli</i> (axis of maize cob, <i>Zea mays</i> Linn.) is given twice daily for 7 days in complaints of kidney and urinary tract stones and severe pain.
<i>Ricinus communis</i> Linn. (Euphorbiaceae),	Root decoction along with half a gram <i>sunthi</i> (dried and powdered rhizomes of <i>Zinziber officinale</i> Rosc.), one pinch of <i>heeng</i> ( <i>Ferula asfoetida</i> Linn.) and common salt is taken twice daily for 7 days to treat kidney stones.
<i>Arandi</i> , <i>Arand Andi</i> , <i>Chian</i>	
<i>Solanum surattense</i> Burm (Solanaceae), <i>Ber Kateli</i> , <i>Neeli Kateli</i>	Root powder along with <i>Bari Kateli</i> ( <i>Solanum indicum</i> Linn.) root powder is given with curd daily for two weeks to expel kidney stones.
<i>Trianthema portulacastrum</i> Linn. (Ficoideae), <i>Saunthi</i> , <i>Lalsubuni</i> <i>Patharchata</i> , <i>Bishkapra</i>	Fresh leaf juice is given twice a day for a week in case of stones problem in both urinary tracts and kidneys.
<i>Tribulus terrestris</i> Linn. (Zygophyllaceae), <i>Gokhuru</i> , <i>Chhota gokhuru</i>	Fruits and root decoction thrice a day is taken regularly for a fortnight to help in expelling kidney stones.
<i>Zea mays</i> Linn. (Poaceae), <i>Makka</i> , <i>Makki</i>	Decoction of styles obtained from female inflorescence or immature cobs are given twice daily for 7 days to expel stones from kidney.

and reduce and relieve the suffering and pain. Some of these plants have also been reported earlier, being used in anti-urolithiatic and lithotriptic preparations from different parts of the country<sup>1,23-29</sup>. A survey of Vedic literature was conducted to elucidate pharmacognostic aspects of herbal crude drugs of plant sources for the cure of urinary tract stones<sup>1</sup>. *Boerhaavia diffusa* Linn. was among the important medicinal plants used for the treatment of stones during Vedic period. Decoction of *B. diffusa* Linn. whole plant is employed in the treatment of calculi by tribal people of Saurashtra, Gujarat, while its roots are used in the treatment of urinary stones by tribals of Akola and Sangamner talukas of Ahmednagar, Maharashtra<sup>23,24</sup>.

Fruit decoction of *Tribulus terrestris* Linn. or their powder is taken in the treatment of renal calculi by tribal people of Gwalior and Saurashtra<sup>23,25</sup>. Decoction of its roots and leaf is used to cure kidney stones by local communities of Kanyakumari district of Tamil Nadu<sup>26</sup>. Bark decoction of *Crataeva nurvala* Buch-Ham is also given in calculi treatment by Saurashtrian tribals<sup>23</sup>. Seeds of *Abutilon indicum* (Linn.) Sw. are employed by tribals of Saurashtra for stone problems<sup>23</sup>. Leaf and tender shoots decoction of *Aerva lanata* (Linn.) Juss. are taken for the treatment of urinary bladder stones in Kanyakumari<sup>26</sup>. 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<sup>27,28</sup>. Decoction of *Trianthema portulacastrum* Linn. is given in calculi treatment by rural and tribal people of Talaja taluka, Gujarat<sup>27</sup>.

In some rural areas of Aligarh district in Uttar Pradesh, tassels (female floral parts) of *Zea mays* Linn. is used for treating kidney stones. Decoction of corn silk (modified style) is taken daily for few days to break kidney stones and help to pass out with urine<sup>29</sup>. *Crataeva nurvala* Buch-Ham. and *Tribulus terrestris* Linn. are already tested for their efficacy against nephrolithiasis and urolithiasis<sup>30-32</sup>. However, other plants reported here are not mentioned in literature for their anti-urolithiatic activity and can be tested with scientific experimentation for their efficacy and safety<sup>33-41</sup>. Among all the plants surveyed, *Equisetum debile* Roxb. and *Gomphrena celosioides* Mart. 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.

## References

- Misra A & Kumar Ashwani, Studies on Ayurvedic drugs for the cure of urinary tract stones, *J Indian Bot Soc*, 79 (Supplement) (2000) 47-48.
- Zaidi SMA, Jamil SS, Singh K & Asif M, Clinical evaluation of herbo-mineral Unani formulation in urolithiasis, In: *Int Conf Ethnopharmacol Alternative Med*, Vth Annual Conf Nat Soc Ethnopharmacol Abstr, (Amala Ayurveda Hospital & Research Centre, Thrissur, Kerala, India), 2006, 42.
- Anonymous, Overview of Current Scenario on Traditional Medicine, In: *Int Conclave Traditional Med*, (Department of AYUSH and NISCAIR, CSIR, New Delhi), 2006, 3-21.
- Jain SK, Notable foreign medicinal uses for some plants of Indian Tradition, *Indian J Traditional Knowledge*, 2 (4) (2006) 321-332.
- Pushpagandhan P, Important Indian Medicinal Plants of Global Interest, In: *Ayurveda and its Scientific Aspects: Opportunities for Globalization*, *Int Conclave Traditional Med*, (Department of AYUSH and NISCAIR, CSIR, New Delhi), 2006, 287-298.
- Purohit AN, Medicines and Medicinal Plants – Past, Present and Future, In: *Proc Natl Symp Plant Sci Res India: Challenges & Prospects*, (BSI Northern Circle, Dehradun), 2005, 60-62.
- Purohit SS & Prajapati ND, Medicinal Plants: Local Heritage with Global Importance, *AGROBIOS News Let*, 1 (8) (2003) 7-8.
- Hussain W, Biodiversity–Conservation of Medicinal Plants, *Proc Natl Symp Biodiversity Germplasm Conserv*, (DN College, Meerut, UP), 2006, 14-19.
- Iqbal M, Medicinal Plant Research in India: Problems and Prospects, *Proc Natl Symp Plant Sci Res India: Challenges & Prospects*, (BSI Northern Circle, Dehradun), 2005, 65.
- Sinha RK, *Ethnobotany-The Renaissance of Traditional Herbal Medicine*, (INA Shree Publishers, Jaipur), 1996.
- Chandra V, Soni P & Sharma SD, Medicinal Plants Conservation with reference to HO and Munda Tribals of Bihar and Orissa, *Proc Workshop on Conservation of Biodiversity in India-Status, Challenges and Efforts* (Indian Council of Forestry Research and Education, Dehradun), 2005, 243-246.
- Singh SP, *Muzaffarnagar Darshan* (An Annual Magazine in Hindi), (Sangam Prakashan, Muzaffarnagar, U P), 2006.
- Gupta RK, Flora of district Muzaffarnagar in the Doab of the rivers Ganga and Yamuna, *J Bombay Nat Hist Soc*, 58 (3) (1961) 749-775.
- Tayal MS & Bhasin L, Additional notes on the flora of Muzaffarnagar, U P, *Bull Bot Surv India*, 12 (1970) 203-207.
- Kumar D, *Floristic Studies of District Muzaffarnagar*, PhD Thesis, (CCS University Meerut, UP, India), 1998.
- Jain SK, *Methods and Approaches-in Ethnobotany*, (Society of Ethnobotanists, NBRI, Lucknow, UP), 1989.
- Martin GJ, *Ethnobotany- A Methods Manual*, (Chapman & Hall, London, UK), 1995.

- 18 Rao RR & Hajra PK, Methods of Research in Ethnobotany In: *A Manual of Ethnobotany*, edited by SK Jain, (Scientific Publishers, Jodhpur), 1995, 28-34.
- 19 Duthie JF, *Flora of the Upper Gangetic Plain and the Adjacent Sivalik and sub-Himalayan Tracts Vols I-III*, (Bishen Singh and Mahendrapal Singh, Dehradun), 1903-1929.
- 20 Maheshwari JK, *The Flora of Delhi*, (CSIR New Delhi, India), 1963.
- 21 Babu CR, *Herbaceous Flora of Dehradun*, (CSIR, New Delhi India), 1977.
- 22 Gaur RD, *Flora of the district Garhwal North West Himalaya (with Ethnobotanical Notes)*, (Trans Media, Srinagar, Garhwal, UP), 1999.
- 23 Bhat DC, Studies on some ethnobotanical plants from Saurashtra, In: *Ethnobotany*, edited by PC Trivedi, (Aavishkar Publishers, Distributors, Jaipur), 2002, 119-127.
- 24 Petkar AS, Wabale AS & Shinde MC, Some ethnomedicinal plants of Akole and Sangamner Talukas of Ahmednagar, *J Indian Bot Soc*, 18 (3-4) (2002) 213-215.
- 25 Singh VK & Khan AM, *Medicinal Plants and Folklores- A Strategy towards Conquest of Human Ailments (Today & Tomorrow Printers & Publishers, New Delhi)*, 1990, 250.
- 26 Jeeva S, Kiruba S, Venugopal N, Dhas SSM, Regini GS, Kingston C, Kavitha A, Sukumaran S, Raj ASD & Laloo RC, Weeds of Kanyakumari district and their value in rural life, *Indian J Traditional Knowledge*, 5 (4) (2006) 501-509.
- 27 Bhat DC, Metha DR, Metha SK & Parmar RP, Studies on some ethnomedicinal plants from Talaja taluka of Bhavnagar district, Gujarat, In: *Ethnobotany*, edited by PC Trivedi, (Aavishkar Publishers, Distributors, Jaipur), 2002, 295-310.
- 28 Sharma R, *Medicinal Plants of India- An Encyclopedia*, (Daya Publishing House, Delhi), 2003.
- 29 Sharma N & Alam MM, Ethnomedicinal study of plants growing in the Aligarh district of North India, *Bioved*, 1 (1) (1990) 89-90.
- 30 Anand R, Patnaik GK, Kulshrestha DK & Dhawan BN, Antiuro lithiatic activity of *Tribulus terrestris* and *Crataeva nurvala* in albino rats, *Indian J Pharmacol*, 21 (1989) 74.
- 31 Anand R, Patnaik GK, Srimal RC & Dhawan BN, Effect of *Crataeva nurvala* on Calcium oxalate nephrolithiasis and hyperoxaluria, *Indian J Pharmacol*, 25 (1993) 53.
- 32 Anand R, Patnaik GK, Srivastava S, Kulshrestha DK & Dhawan BN, Evaluation of Antiuro lithiatic activity of *Tribulus terrestris*, *Int J Pharmacog*, 32 (1994) 548.
- 33 Dey KL, *Indigenous Drugs of India*, (Thacker, Spink & Co Calcutta, India), 1896.
- 34 Kiritkar KR & Basu BD, *Indian Medicinal Plants*, (Lalit Mohan Basu, Allahabad), 1933.
- 35 Nadkarni AK, *Nandkarni's India Materia Medica with Ayurvedic, Unani, Siddha, Allopathic, Homoeopathic, Naturopathic and Home Remedies*, (Popular Book House, Bombay), 1955.
- 36 Chopra RN, Nayar SL & Chopra IC, *Glossary of Indian Medicinal Plants*, (Publication and Information Directorate, New Delhi), 1956.
- 37 Chopra RN, *Indigenous Drugs of India*, (UN Dhar & Sons Pvt Ltd, Calcutta), 1968.
- 38 Chopra RN, Chopra IC & Verma BS, *Supplement to Glossary of Indian Medicinal Plants*, (Publication and Information Directorate, New Delhi), 1969.
- 39 Anonymous, *The wealth of India-Raw Materials*, (Publication and Information Directorate, New Delhi), 1956-1981.
- 40 Chatterjee A & Prakash SC, *The Treatise on Indian Medicinal Plants*, (Publication and Information Directorate, New Delhi), 1995.
- 41 Mukherjee Tapan, Neraj Bhatla, Gian Singh & HC Jain, Herbal Medicine for Kidney Stones: Review, *Indian Drugs*, 21 (6) 1984, 224-228.