



Review Article

ISSN: 2454-5023
J. Ayu. Herb. Med.
2020; 6(3): 194-201
© 2020, All rights reserved
www.ayurvedjournal.com
Received: 15-06-2020
Accepted: 28-07-2020

Mutravirechaniya mahakashaya as a solution towards urinary disorders – A compilation on research based evaluation

Darshana Deka¹

¹ Sonali Path, Backside of old Rupnagar Post office, House No. 4, Indrapur, Kamrup- 781032, Assam, India

ABSTRACT

Renal disorders are growing very rapidly among people all over the world nowadays and the treatment modalities available in modern medicine have undesirable side effects on human health. Plants of *mutravirechaniya mahakashaya*, described as, 35th *mahakashaya* in the 4th chapter of *Charaka Samhita, Purvardha* are mostly recognised for their urine inducing or urinary flow increasing capacity along with urinary system defending property in the ancient ayurvedic medical science. Formulations containing these plants as main ingredients have been regularly prescribed for the cases of abdominal fluid collection, renal problems, renal calculi, fluid collection in the lower extremities or any other cases of fluid overload in traditional system of Indian medicine. Studies approving urinary flow enhancing capacity along with the urinary calculi destroying property for the active ingredient of the individual plant, explain these plants' utilization for renal diseases. Induction of adequate urine output is the basic concept of treatment for these disorders as majority of these conditions hamper normal filtration mechanism of the excretory system. Current article tries to specify the research works done scientifically upon the herbs having diuretic properties grouped together under the roof of *mutravirechaniya mahakashaya* in ayurvedic classics. It is composed of the knowledge gained from various scholarly articles, scientific papers, books and research topics gathered through the medium of documentation and internet. The presented compilation work helps towards proving its biological activities and pharmacology of its extracts which will contribute towards further exploration of this group of great clinical potential. However, further studies should be carried out to identify the mechanism of the pharmacological actions of these drugs classically mentioned in a group of diuretics.

Keywords: Renal, Mutravirechaniya, Mahakashaya, Purvardha, Pharmacological, Diuretics.

INTRODUCTION

Kidney, urinary bladder, ureter and urethra collectively form the excretory system. Urinary disorders include any disorders that affect any part of the urinary tract or affect their function. Pain abdomen, backache, uneasiness in the lower abdomen, haematuria, troubled urination regarding flow and urine output, burning micturition, urgency with repeated urination and pyrexia are the general indications of renal system disorders [1]. The urinary system or the renal system produces, stores and eliminates urine. When the bladder is full, a person urinates through the urethra to eliminate the waste [2]. When the urinary tract work together in the correct order, then only one can urinate normally. Kidney and urinary system diseases are pointed out to be meant for around 830,000 deaths along with 18,467,000 disorders yearly, which holds it in the 12th rank amongst the factors causing death and in the 17th rank amongst the factors causing dysfunction as per the approximate calculation of universal burden of diseases [3]. Analgesics, antibiotics, chemotherapy, radiotherapy and surgical procedures are the commonly existing therapies for the urinary system disorders in modern system of management [4]. A broad spectrum for diuretic drugs has been described in modern system of medicine. Diuretics help to remove excess fluid from the body by increasing the renal performance in the form of increased urine output [5]. Diuretics are also used to lower urinary calcium excretion, making them useful in preventing calcium-containing kidney stones [6]. Diuretic drugs are very effective but they also have side effects [7]. The attention of the people has diverted towards herbal medicines due to the undesirable effects of the modern medicines. Many Indian medicinal plants are reported for their remarkable diuretic activities. Due to its safety, efficacy and lesser side effects as compared to synthetic drugs, medicinal plants including plants with diuretic properties are used from centuries all over the world.

Ancient ayurvedic classic like *Charaka Samhita* has a solution to urinary system disorders in the name of "*Mutravirechaniya Mahakashaya*" (Diuretics) [8]. This is a group of 10 drugs which are individually or in combination are capable of treating various urinary system disorders. Among the total 50 *mahakashaya*, described in the 4th chapter of *Charaka Samhita, Purvardha*, 35th *mahakashaya* is the *mutravirechaniya mahakashaya* as follows, "*Vrukshadani Shvadanshra Vasuka Vashira Pashanabheda Darbha Kusha Kasha Gundrotkatamulanitee dashemani mutravirechaniyani bhavanti* [9]. This paper aims to evolve the efficacious

*Corresponding author:

Dr. Darshana Deka

Sonali Path, Backside of old
Rupnagar Post office, House No. 4,
Indrapur, Kamrup- 781032,
Assam, India
Email: dekadarshana07@gmail.com

herbal solutions of the drugs mentioned in *Mutravirechaniya mahakashaya* quoted by *Acharya Charaka* adapted and reported by various scientific journals to combat the urinary system disorders. Data on utilization of various herbal solutions among the group of 10 drugs from research based studies available in famous scientific journals for contending urinary system disorders are also compiled.

MATERIALS AND METHODS

Nowadays, renal disorders are growing very rapidly among people. Classical reference of 10 diuretic herbs named as *Mutravirechaniya mahakashaya* by *Acharya Charaka* is found to cure effectively urinary disorders like frequent urination, various urinary tract infections and urinary tract calculi with some herbs having the properties to preserve renal function. These herbs have been applied since a long duration in the Ayurvedic medicinal system because of their efficacy in urinary system disorders. Some of their therapeutic efficacy is scientifically validated and documented by modern researchers, and a search for that

is made here, in this article. Here, we have reviewed various research activities, performed on the plants of *mutravirechaniya mahakashaya* which have been reported for their efficacy on urinary system disorders and their scientifically proved pharmacological activities useful for urinary disorders are summarized as much as possible. To search for the research activities performed on the plants, the names like *Vrukshadani*, *Shvadanshtra* etc as mentioned in the *mutravirechaniya mahakashaya* are used. The description of the individual herb including their scientific names, as mentioned in the books of *dravya guna vigyana* of Ayurvedic classics are also used to assist the search. The available scientific studies on the plants are summarized in table 1. Google and Google Scholars were searched and the following keywords- diuretic activities, *Vrukshadani*, *Shvadanshtra*, *Vasuka*, *Vashira*, *Loranthus falcatus*, *Tribulus terrestris*, *Osmanthus fragrans*, *Achyranthus aspera*, *Bergenia Ligulata* etc. As some drugs like *gundra*, *itkatmula*, *pashanbhed* are very much controversial, classical texts, theis, google scholar and the text books of *Dravyaguna vigyana* are referred for scientific review.

Table 1: Scientifically proved pharmacological activities of the plants of *mutravirechaniya mahakashaya* against urinary disorders (reported from various scientific journals)

Plants of <i>mutravirechaniya mahakashaya</i>	Pharmacological Activities reported (Urinary system related)	Details of study/ report	Urinary system disorders for which can be used
<i>Vrukshadani</i> (<i>Dendrophthoe falcata</i> L. f.) [10,11]	Antimicrobial activity	- Petroleum ether, chloroform and ethanolic extracts exhibit considerable growth inhibiting capacity for a large number of pathogenic microorganisms including a huge range of gram positive and gram negative bacteria and the fungi including the most virulent candida albicans species and candida tropicalis, pathogenic aspergillus species, some infection transmitting bacteria like E coli and S- typhi[12]	UTI
	Diuretic activity, Urinary stone formation preventing capacity	- Preparation of active ingredient of <i>Dendrophthoe falcata</i> in the medium of water and alcohol were investigated to establish its calculi destroying capacity and aqueous preparation was experienced for urinary output enhancing capacity. When aqueous preparation of active ingredient (4 g/kg p.o.) was tested in rats and comparison made with frusemide (4 mg/kg) and hydrochlorthiazide (10 mg/kg), it showed considerable enhancement of urinary output with increased secretion of excess salts was observed. The animals in which extraction of active principle of the experiment drug (4 g/kg, p.o.) in water and alcoholic medium, there was noticed significant decrease in the weight of magnesium ammonium phosphate stones, caused by setting in zinc disc in the urinary bladder of rats compared to control group managed by ethylene glycol.[13]	Urinary calculi
		- Active ingredient preparation of <i>Tribulus terrestris</i> fruit and leaves in water medium in 5 g/kg dose by mouth showed active diuresis in rat diuretic model. This was a little higher than the diuretic effect caused	

<p><i>Shvadhanshra</i> (<i>Tribulus terrestris</i>)^[14,15]</p>	<p>Diuretic activity</p>	<p>by furosemide. The improved elasticity of the smooth muscles and the diuretic effect created by <i>Tribulus terrestris</i>, assisted the process of expulsion of calculi down the urinary passage^[16].</p> <p>- Various preparation containing the active ingredient of <i>Tribulus terrestris</i> fruits in water and alcoholic medium along with water extract of the crude drug called as decoction or <i>kwatha</i> and coarse powder are tested for their diuretic action in rats by Saurabh and co-workers. More diuretic action along with added benefit of potassium sparing action compared to reference standard frusemide was evaluated with high strength <i>kwatha</i>^[17].</p> <p>- The main mode of action for <i>Tribulus terrestris</i>'s renal calculi development prevention action is suggested to be its diuretic activity as per a recent study performed outside body with human urine^[18].</p>	<p>Urinary calculi and renal hypertension</p>
	<p>Antiuro lithiac activity</p> <p>And cytoprotection</p>	<p>Active ingredient extraction of <i>Tribulus terrestris</i> fruits showed considerable concentration dependent therapeutic safety in opposition to collection of stone forming substance around the glass bead implanted to induce urolithiasis in albino rats, leukocytosis, and elevation in serum urea levels^[19].</p> <p>- The action of <i>Tribulus terrestris</i> over the process of formation of calcium oxalate (CaOx) crystals and their growth and oxalate created renal epithelial cellular injury was tested by the experiment done by Aggarwal. The study showed that <i>Tribulus terrestris</i> is not only capable of preventing the process of formation of calcium oxalate (CaOx) crystals and its growth but also has a role on protection of cells against cellular injury^[20].</p> <p>- <i>Tribulus terrestris</i> showed its urolithiasis preventing capacity on different examples of sodium glycolate and ethylene glycol induced stone formation^[21].</p> <p>- Glycolate oxidase (GOX) which is one of the main enzymes required for oxalate formation is prevented by <i>Tribulus terrestris</i> and its antiuro lithiac activity is attributed to this property. The inhibition of glycolate oxidase was due to the effective ingredients of <i>Tribulus terrestris</i> namely quercetin and kaempferol which were evaluated to be its non-competitive and competitive inhibitors respectively^[22].</p> <p>- Chaudhuri et al identified that Nephroprotective action of <i>T. terrestris</i> by the renal damage produced by gentamicin was decreased when given simultaneously with <i>T. terrestris</i> extract to albino rats^[23].</p> <p>- Nagarkatti stated that the simultaneous administration of 200mg/kg/day of <i>T. terrestris</i> and gentamycin to female rat's decreased gentamycin induced renal damage in both structural and functional terms. The effect was comparable to verpamil.^[24]</p> <p>- The results of the investigation carried out by Kavitha and Jagadees showed that methanolic fraction of <i>Tribulus terrestris</i> fruit extraction application through oral route provided protection on the kidney tissues against the mercuric chloride induced toxicity in the mice^[25].</p>	<p>Urinary calculi and renal damage</p>

	Antibacterial activity	- Most active efficacy against gram-positive and gram-negative bacteria were showed by the active ingredient extraction of Tribulus terrestris fruit in methanolic medium. Active ingredient extraction in petroleum ether and chloroform were found to have moderate action.	UTI
Vasuka (<i>Boerhaavia diffusa</i> Linn) ^[28,29]	Diuretic and Renal activity	<ul style="list-style-type: none"> - As per the experiment carried out by Chauhan <i>et al</i>/ outside living organism it was evaluated that its aqueous extract is effective in preventing growth of struvite crystals consisting of ammonium magnesium phosphate hexahydrate (AMPH). It is mostly evaluated in urinary calculi in females and application of 0.5 and 1.0% extract formed 50 and 71.42% reduction in the amount of crystals^[30]. - While comparing the efficacy of <i>Convolvulus pluricaulis</i> and <i>Boerhaavia diffusa</i> studied inside living body against the diuretic and anti-inflammatory action of barbiturate and it is evaluated that <i>Boerhaavia diffusa</i> root extract exhibits considerable diuretic efficacy^[31]. - For the treatment of further diseases of urinary system also like calculus, cystitis and renal hypertension the root is used^[32]. - With special reference to nephrotic syndrome, the <i>Boerhaavia diffusa</i> extract is evaluated as having diuretic effect^[33,34]. - The diuretic effect of <i>Boerhaavia diffusa</i> extract was tested^[35]. - Due to the presence of potassium content, the water soluble fraction of its root and leaves was found to be diuretic in male albino rats and dogs^[36]. - Noticeable diuretic effect was evaluated for the glucosidic compound extracted from plant^[37]. - It was found that β-ecdysone extracted from the root of <i>Boerhaavia diffusa</i> is responsible for its diuretic potencial^[38]. 	Urinary calculi and renal hypertension
Vashira (<i>Achyranthes aspera</i> Linn) ^[39,40]	Nephroprotective Activity	<ul style="list-style-type: none"> - Nephrodefensive action of <i>Achyranthes aspera</i> against lead acetate created nephrotic injury in male albino rats was found for the methanolic extract of the whole plant and it was reported by T. Jayakumar and co workers (2009)^[41]. - <i>Achyranthes aspera</i> was tested and found as preventive of renal calculi (calcium oxalate, calcium carbonate and calcium phosphate etc.) mineralization^[42]. - The roots are found effective on preventing calcium oxalate crystalization and its growth tested in a test tube and also effective on renal tubular epithelial cell injury in rats^[43]. - Preventive action of active ingredient extraction of the plant in hydroalcoholic medium on calcium oxalate stone formation was evaluated in artificial urine and it was found efficacious^[44]. 	Urinary calculi and renal damage

	Diuretic activity	<ul style="list-style-type: none"> - Elevated diuretic efficacy was found in male rats from the <i>Achyranthes aspera</i> entire plant methanolic extract as evaluated by Saurabh Srivastav and co-workers.(2011) [45]. - Considerable diuretic efficacy of <i>Achyranthes aspera</i> seed extracted saponin was found in male albino rats as studied by S.S. Gupta and co- workers (1972)[46]. - Diuretic action of achyranthine in 5mg/ kg dose by mouth was studied in rats and was found effective[47]. 	Urinary calculi and renal hypertension
Pashanbheda (<i>Bergenia ligulata</i>) ^[48,49]	Antiuro lithiac activity	<ul style="list-style-type: none"> - Anti urolithiac action of the active ingredient of <i>Bergenia ligulata</i> rhizomes extracted in methanol and the isolated ingredient like bergenin were tested in albino rats. There are many experiments which support the long- established applications of <i>Bergenia ligulata</i> in renal diseases^[50,51,52]. - Considerable decomposition of renal stone both in renal and urine component was observed from methanolic extract of <i>Bergenia ligulata</i> and bergenin^[53]. - CaC₂O₄ crystalization prevention, diuretic and antioxidant action of <i>Bergenia ligulata</i> are supposed to be responsible for its antiuro lithiac action^[54]. 	Urinary calculi and kidney disorders
	Diuretic activity	- With the help of the method suggested by Lipschitz with furosemide tablet as standard, the diuretic action of <i>Bergenia ligulata</i> was evaluated. The active ingredients like flavonoids and saponins existing in alcoholic extract of <i>Bergenia ligulata</i> roots were suggested as responsible components for its diuretic action.	
Darva (<i>Imperata cylindrical</i>) ^[56,57]	Diuretic activity	Dubey, S.D. <i>et al.</i> (1985) have been studied the pharmacology of <i>I. cylindrical</i> in experimental albino rats and reported to have significant diuretic, natriuretic and Kaluretic actions ^[58] . - The root is, diuretic ^[59] .	Urinary calculi and renal hypertension
	Haemostatic activity	- The root is haemostatic. It is used in the treatment of haematuria ^[60] .	Haematuria
	Antibacterial action	- The root has antibacterial action against <i>Staphylococcus aureus</i> , <i>Bacillus dysenteriae</i> etc ^[61]	UTI
Kush (<i>Desmostachya bipinnata</i>) ^[62,63]	Diuretic activity	- Considerable diuretic action and improved urinary output compared to furosemide (P<0.01) was observed for the hydroalcoholic extract of <i>Desmostachya bipinnata</i> . Urinary electrolytes levels (Na ⁺ , K ⁺ , and Cl) are also enhanced with this ^[64] .	Urinary calculi and renal hypertension
	Antiuro lithiac activity	- Considerable fall in the amount of renal calcium oxalate accumulation was observed in urinary calculi formation caused test group rats in case of active ingredient extraction of <i>Desmostachya bipinnata</i> in water medium. Calcium oxalate stone formation caused chemical processes in living things were also setback by it ^[65] .	Urinary calculi
	Antimicrobial activity	- Signifiacant antimicrobial activities were noticed from the important oil extracted from the aerial parts of	UTI

		<i>Desmostachya bipinnata</i> against various bacterial pathogens like <i>S. aureus</i> , <i>S. epidermis</i> , <i>E. coli</i> etc ^[66] .	
Kasa (<i>Saccharum spontaneum</i> Linn.) ^[67,68]	Antilithiatic activity	- Ethanolic root extract of <i>S. spontaneum</i> has curative effect on stone formation induced by ethylene glycol ^[69] .	Urinary calculi
Gundra (<i>Typha australis</i> Schum. and Thonn., <i>Typha elephantina</i> Grah.) ^[70,71,72]	Antirolithiatic activity	- Roots decoction is used in India: To boil 3–6 g of dried roots in one L of water to use 125 ml OD till stone expulsion ^[73] .	Urinary calculi
	Diuretic activity	- Gundra is studied to be as shita birya (cooling potency), mutrajanak (diuretic), and pittashamak (alleviates pitta) in character ^[74] .	Renal hypertension and urinary calculi
Itkatamul (<i>Saccharum munja</i> Roxb, <i>Sesbania bispinosa</i> W. F. Wight, <i>Sesbania cannabina</i> Retz.) ^[75,76,77,78]	Antibacterial activity	- Active ingredient extraction of leaf and stem of <i>Saccharum munja</i> was found to be antimicrobial against gram negative <i>E. coli</i> . A large extent of inhibitory effect was noticed from leaf and stem extract ^[79] .	UTI
	Diuretic and antilithiatic activity	- It is applied in urinary calculi cases for its shita virya (cold potency) and mutrajanak (diuretic) qualities ^[80] . - In India, root powder 3–6 g mixed with sugar solution in water is taken. Pharmacological activities: Roots possess antioxidant and leaves have lithotriptic properties ^[81,82] .	Renal hypertension and urinary calculi

CONCLUSION

Urinary system disorders are very common nowadays. Urolithiasis is a common problem worldwide due to its high recurrence rate. From the dawn of civilization, plants are the part of human society and are playing a vital role in maintaining human health. As modern therapeutic procedures have serious side effects, concentration on medicinal herb exploration has been greater than before worldwide extensively in the present time. Extensive research works are going on for the establishment of important medication action of active ingredient extraction of various plants. Detailed documentation of scientific evidence about the pharmacological activities of 10 plants of classical diuretic group were not available as such although some plants have been widely studied for their biological activities by some scholars over the centuries. The present article has tried to give an account of updated information on various pharmacological properties of classical diuretic group as much as possible. However, some drugs in the mutravirechaniya mahakashaya are controversial like pashanbheda as their scientific names are lacking in the original texts. While some plants like gundra and itkatmula are rarely seen. They are searched for available scientific studies with their sanskrit names as well as botanical names derived from various concerned books. The classical books mentioned in the reference section are followed for the such purposes. Thus plants from classical diuretic group are searched for the available literature on their scientifically documented pharmacological activities in this review. The mechanism by which they modify the disease conditions is not evaluated till now and more studies are needed to be carried out at the molecular level for this purpose. The pharmacological studies summarized in this review will help the upcoming researchers to focus on further clinical and formulation studies which will be very much beneficial for the mankind in near future and also contribute towards achievement of a status of effective plant based medicine in various urological disorders.

REFERENCES

- <https://www.healthgrades.com/conditions/urinary-disorders>
- <https://www.livescience.com/27012-urinary-system.html>
- https://www.ncbi.nlm.nih.gov/books/NBK11791/#_A5116_
- <https://www.healthgrades.com/conditions/urinary-disorders>
- Brater, D. C., 2000, Pharmacology of Diuretics. American Journal of the Medical Sciences 319, 38– 50.
- <https://www.rxlist.com/diuretics/drugs-condition.htm>
- Satoshkar RS Bhandarkar SD, Ainapure SS. Pharmacology and Pharmacotherapeutics. 18 th edition. Mumbai: Popular Prakashan Pvt. Ltd; 2003; pp 538-50.
- Acharya Charaka, Charak Samhita, edition 2004, New Delhi, India. Chaukhamba Orientalia Varanasi, 1998. Section 1 Sutrasthanam, Chapter IV, verse no. 24.
- Dr. Brahmanand Tripathi, Acharya Agnivesha's Charaka Samhita, Edited with Charaka- Chandrika Hindi commentary, Chaukhamba surbharati Prakashan, Varanasi, India. Edition 2006. Sutrasthan-chapter 4- Verse no. 15, Page no. 90.
- Charak Samhita of Maharsi Agnivesha with Ayurveda - Dipika Sanskrit Commentary by Chakrapanidutta, Tattvaprasasini Hindi Commentary of 'Ayurveda- Dipika' edited and commented by Dr. Lakshmidhar Dwivedi, Dr. B.K. Dwivedi and Dr. P.K. Goswami, Chaukhamba Krishnadas Academy, Varanasi, 2012, Part 1, Sutrasthanam, 4/35, p- 119
- Dravyaguna Vigyana by Prof. P.V. Sharma, Chaukhamba Bharati Academy, Varanasi, 2006, Vol-2, (Vegetable Drugs), p: 648-649
- Pattanayak SP, Sunita P. Wound healing, anti-microbial and antioxidant potential of *Dendrophthoe falcata* (Lf) Ettingsh. Journal of ethnopharmacology. 2008;120(2):241-7.
- Aleykutty NA, Srinivassan KK, Rao PG, Udupa AL, Keshavamurthy KR. Diuretic and antilithiatic activity of *Dendrophthoe falcata*. Fitoterapia. 1993;64(4):325-31.
- Charak Samhita of Maharsi Agnivesha with Ayurveda - Dipika Sanskrit Commentary by Chakrapanidutta, Tattvaprasasini Hindi Commentary of 'Ayurveda- Dipika' edited and commented by Dr. Lakshmidhar Dwivedi, Dr. B.K. Dwivedi and Dr. P.K. Goswami, Chaukhamba Krishnadas Academy, Varanasi, 2012, Part 1, Sutrasthanam, 4/35, p- 119

15. Dravyaguna Vigyana by Prof. P.V. Sharma, Chaukhambha Bharati Academy, Varanasi, 2006, Vol-2, (Vegetable Drugs), p: 632-634.
16. Dr. Shameen Salim live ayurveda life-Ayurvedic Herbs Gokshura-*Tribulus terrestris*. Jun 15, 2014,0182. Available form: www.Liveayurveda.com/home-ayurvedic herbs/ gokshura.
17. Al-Ali M, Wahbi S, Twajj H, Al-Badr A. *Tribulus terrestris*: Preliminary study of its diuretic and contractile effects and comparison with *Zea mays*. *J Ethnopharmacology*. 2003;85:257-60.
18. Chhatre S, Nesari T, Somani G, Kenjale R, Sathaye S. Comparative Evaluation of Diuretic Activity of Different Extracts of *Tribulus terrestris* Fruits in Experimental Animals. *Int J Res Phytochem Pharmacol*. 2012;3:129-33.
19. Joshi MJ, Ashok AE, Vaidya DB. Inhibition of the growth of urinary calcium hydrogen phosphate dehydrate crystals with aqueous extracts of *Tribulus terrestris* and *Burgenia ligulata*. *Urol Res* 2005; 33(2):80-6.
20. Anand R, Patnaik GK, Kulshreshtha DK, Dhawan BN. Activity of certain fractions of *Tribulus terrestris* fruits against experimentally induced urolithiasis in rats. *Indian J Exp Biol*. 1994;32:548-52.
21. Aggarwal A, Tandon S, Singla SK, Tandon C. A novel antilithiatic protein from *Tribulus terrestris* having cytoprotective potency. *Protein Pept Lett*. 2012;19:812-9.
22. Sangeeta D, Sidhu H, Thind SK, Nath R. Effect of *Tribulus terrestris* on oxalate metabolism in rats. *J Ethnopharmacol*. 1994;44:61-6.
23. Shirfule AL, Sangamwar AT, Khobragade CN. Exploring glycolate oxidase (GOX) as an antiurolithic drug target: Molecular modeling and *in vitro* inhibitor study. *Int J Biol Macromol*. 2011;49:62-70.
24. Chaudhuri SB, Marjit B, Mukherjee PK, Ram AK, Munshi S, Das N et al. Nephroprotective action of *Tribulus terrestris* Linn. *Indian Journal of Pharmacology* 2001; 33:124-45.
25. Nagarkatti DS, Rege NN, Mittal BV, Uchil DA, Desai NK, Dhanukar SA. Nephroprotection by *Tribulus terrestris* India, 1994.
26. Kavitha AV, Jagadeesan G. Role of *Tribulus terrestris* (Linn.) (Zygophyllaceae) against mercuric chloride induced nephrotoxicity in mice, *Mus musculus* (Linn.). *Journal of Environmental Biology*. 2006; 27:397-400.
27. Al-Bayati FA, Al-Mola HF. Antibacterial and antifungal activities of different parts of *Tribulus terrestris* L. growing in Iraq. *J Zhejiang Univ Sci B*. 2008;9:154-9.
28. Charak Samhita of Maharsi Agnivesha with Ayurveda - Dipika Sanskrit Commentary by Chakrapanidutta, Tattvaparakasini Hindi Commentary of 'Ayurveda- Dipika' edited and commented by Dr. Lakshmidhar Dwivedi, Dr. B.K. Dwivedi and Dr. P.K. Goswami, Chaukhamba Krishnadas Academy, Varanasi, 2012, Part 1, Sutrasthana,4/35, p- 119
29. Dravyaguna Vigyana by Prof. P.V. Sharma, Chaukhambha Bharati Academy, Varanasi, 2006, Vol-2, (Vegetable Drugs), p: 630-632
30. Chauhan CK, Joshi MJ, Vaidya ADB. Growth inhibition of struvite crystals in the presence of herbal extract *Boerhaavia diffusa* Linn. *The American Journal of Infectious Diseases*. 2009; 5 (3):177-186. [Google Scholar]
31. Mudgal V. Studies on medicinal properties of *Convolvulus pluricaulis* and *Boerhaavia diffusa*. *Planta Medica*. 1975;28(1):62-68.
32. Gaitonde BB, Kulkarni HJ, Nabar SD. Diuretic activity of punarnava (*Boerhaavia diffusa*). *Bulletins of the Haffkine Institute (Bombay, India)* 1974; 2:24
33. Singh RP, Shokala KP, Pandey BL, Singh RG, Usha Singh R. Recent approach in clinical and experimental evaluation of diuretic action of Punarnava (*Boerhaavia diffusa*) with special reference to nephrotic syndrome. *J Ind Med Res* 1992; 11: 29-36
34. Singh RH, Udupa KN. Studies on the Indian indigenous drug punarnava (*Boerhaavia diffusa* L.). Preliminary controlled clinical trial in nephrotic syndrome. *Journal of Research in Indian*. 1972;7: 28-33
35. Gaitonde BB, Kulkarni HJ, Nabar SD. Diuretic activity of punarnava (*Boerhaavia diffusa*). *Bulletins of the Haffkine Institute (Bombay, India)* 1974; 2:24.
36. Bhide NK, Altekhar WW, Trivedi JC, Sheth UK. Potassium diuretics in the Ayurvedic system of medicine. *J. Postgrad Med*. 1958;4: 21-27.
37. Haravey SK. A preliminary experimental study of the diuretic activity of some indigenous drugs. *Indian J. Med. Res.*, 1966; 54: 774-778.
38. Suri OP, Kant R, Jamwal RS, Suri KA, Atal CK. *Boerhaavia diffusa*, a new source of phytoecdysones. *Planta Med*. 1982;44: 180-181.
39. Charak Samhita of Maharsi Agnivesha with Ayurveda - Dipika Sanskrit Commentary by Chakrapanidutta, Tattvaparakasini Hindi Commentary of 'Ayurveda- Dipika' edited and commented by Dr. Lakshmidhar Dwivedi, Dr. B.K. Dwivedi and Dr. P.K. Goswami, Chaukhamba Krishnadas Academy, Varanasi, 2012, Part 1, Sutrasthana,4/35, p- 119
40. Dravyaguna Vigyana by Prof. P.V. Sharma, Chaukhambha Bharati Academy, Varanasi, 2006, Vol-2, (Vegetable Drugs), p: 542-544
41. Jayakumar. T., Sridhar, M.P., Bharathprasad, T.R., Ilayaraja, M., Govindasamy, S. and Balasubramanian, M.P. Experimental studies of *Achyranthes aspera* (L) preventing Nephrotoxicity induced by lead in Albino rats, *Journal of Health Science*. 2009; 55(5): 701-708.
42. Farook NAM, Rajesh S, Jamuna M. Inhibition of mineralization of urinary stone forming minerals by medicinal plants. *E-Journal of Chemistry*. 2009;6(3):938-42.
43. Aggarwal A, Tandon S, Singla SK, Tandon C. Reduction of oxalateinduced renal tubular epithelial (NRK-52E) cell injury and inhibition of calcium oxalate crystallisation *in vitro* by aqueous extract of *Achyranthes aspera*. *International Journal of Green Pharmacy*. 2010;4(3):159-64.
44. Pareta SK, Patra KC, Harwansh R, In-vitro calcium oxalate crystallization inhibition by *Achyranthes indica* Linn. hydroalcoholic extract: an approach to antilithiasis, *International Journal of Pharma and Bio Sciences*, 2(1), 2011, 432-437.
45. Srivastav S, Singh P, Jha K.K, Misra G, Srivastava S, Karchuli M.S, Khosa R.L. Diuretic activity of whole plant extract of *Achyranthes aspera* Linn . *European Journal of Experimental Biology*, 2011; 1 (2):97-102.
46. Gupta, S. S., Verma, S. C. L., Ram, A. K. and Tripathi, R. M. Diuretic effect of the saponin of *Achyranthes aspera* (apamarga). *Ind.J.Pharmac*. 1972; 4(4): 208-214.
47. Neogi, N. C., Garg, R. D. and Rathor, R. S. Preliminary pharmacological studies on achyranthine. *Indian J Pharm*. 1970; 32 (2): 43-46.
48. Charak Samhita of Maharsi Agnivesha with Ayurveda - Dipika Sanskrit Commentary by Chakrapanidutta, Tattvaparakasini Hindi Commentary of 'Ayurveda- Dipika' edited and commented by Dr. Lakshmidhar Dwivedi, Dr. B.K. Dwivedi and Dr. P.K. Goswami, Chaukhamba Krishnadas Academy, Varanasi, 2012, Part 1, Sutrasthana,4/35, p- 119
49. Dravyaguna Vigyana by Prof. P.V. Sharma, Chaukhambha Bharati Academy, Varanasi, 2006, Vol-2, (Vegetable Drugs), p- 650-652.
50. Basant B, Chaurasia OP, Zakwan A, Singh SB: Traditional medicinal plants of cold desert, Ladakh-used against kidney and urinary disorders. *Journal of Ethnopharmacology* 2008; 118:331-339References and further reading may be available for this article. To view references and further reading you must .
51. Gurocak S, Kupeli B: Consumption of historical and current phytotherapeutic agents for urolithiasis: A Critical Review. *The Journal of Urology* 2006;176:450-455.
52. Sharma HK, Chhangte L, Dolui AK: Traditional medicinal plants in Mizoram, India. *Fitoterapia* 2001;72:146-161
53. Satish H, Umashankar D: Comparative study of methanolic extract of *Burgenia ligulata* Yeo. with isolated constituent bergenin in urolithiatic rats. *Biomed* 2006;1:80-87.
54. Bashir S, Gilani A: Antiurolithic effect of *Burgenia ligulata* rhizome: An explanation of the underlying mechanisms. *Journal of Ethnopharmacology* 2009; 122:106-116.
55. Charak Samhita of Maharsi Agnivesha with Ayurveda - Dipika Sanskrit Commentary by Chakrapanidutta, Tattvaparakasini Hindi Commentary of 'Ayurveda- Dipika' edited and commented by Dr. Lakshmidhar

- Dwivedi, Dr. B.K. Dwivedi and Dr. P.K. Goswami, Chaukhamba Krishnadas Academy, Varanasi, 2012, Part 1, Sutrasthana,4/35, p- 119
56. Dravyaguna Vigyana by Prof. P.V. Sharma, Chaukhambha Bharati Academy, Varanasi, 2006, Vol-2, (Vegetable Drugs), p- 635
 57. Singh N, Juyal V, Gupta A, Gahlot M: Evaluation of ethanolic extract of root of *Bergenia ligulata* for hepatoprotective, diuretic and antipyretic activities. *Journal of Pharmacy Research* 2009;2:958-960.
 58. Dubey S.D., Trinapanchamul Ka Adhyayan, ph.D. thesis Deptt. Of Dravyaguna, IMS, BHU, Varanasi, India; 1985.
 59. <https://pfaf.org/user/Plant.aspx?LatinName=Imperata+cylindrica>
 60. <https://pfaf.org/user/Plant.aspx?LatinName=Imperata+cylindrica>
 61. <https://pfaf.org/user/Plant.aspx?LatinName=Imperata+cylindrica>
 62. Charak Samhita of Maharsi Agnivesha with Ayurveda - Dipika Sanskrit Commentary by Chakrapanidutta, Tattvaparakasini Hindi Commentary of 'Ayurveda- Dipika' edited and commented by Dr. Lakshmidhar Dwivedi, Dr. B.K. Dwivedi and Dr. P.K. Goswami, Chaukhamba Krishnadas Academy, Varanasi, 2012, Part 1, Sutrasthana,4/35, p- 119
 63. Dravyaguna Vigyana by Prof. P.V. Sharma, Chaukhambha Bharati Academy, Varanasi, 2006, Vol-2, (Vegetable Drugs), p- 634
 64. Golla UR, Gajam PK, Raj BSS. 2014. Evaluation of diuretic and laxative activity of hydroalcoholic extract of *Desmostachya bipinnata* (L.) Stapf in rats. *J Int Med* 12: 372 - 378.
 65. Kishore Nr, Mangilal T, Anjaneyulu N, Abhinayani G, Sravya N. 2014. Investigation of antiurolithiatic activity of *Brassica oleracea gongylodes* and *Desmostachya bipinnata* in experimentally induced urolithiasis in animal models. *Int J Pharm Pharm Sci* 6: 602 – 604
 66. Kumar AK, Sharvane, Patel J, Choudhary RK. 2010. Chemical composition and antimicrobial activity of the essential oil of *Desmostachya bipinnata* (Linn.). *Int J Phyt Med* 2: 436 – 439
 67. Charak Samhita of Maharsi Agnivesha with Ayurveda - Dipika Sanskrit Commentary by Chakrapanidutta, Tattvaparakasini Hindi Commentary of 'Ayurveda- Dipika' edited and commented by Dr. Lakshmidhar Dwivedi, Dr. B.K. Dwivedi and Dr. P.K. Goswami, Chaukhamba Krishnadas Academy, Varanasi, 2012, Part 1, Sutrasthana,4/35, p- 119
 68. Dravyaguna Vigyana by Prof. P.V. Sharma, Chaukhambha Bharati Academy, Varanasi, 2006, Vol-2, (Vegetable Drugs), p- 636
 69. M.Sathya et al. 2012 . Antilithiatic activity of *saccharum spontaneum* linn. on ethylene glycol – induced lithiasis in rats, *International Journal of Pharma Sciences and Research* ISSN : 0975-9492 Vol 3 No 9 : 467-472 .
 70. Charak Samhita of Maharsi Agnivesha with Ayurveda - Dipika Sanskrit Commentary by Chakrapanidutta, Tattvaparakasini Hindi Commentary of 'Ayurveda- Dipika' edited and commented by Dr. Lakshmidhar Dwivedi, Dr. B.K. Dwivedi and Dr. P.K. Goswami, Chaukhamba Krishnadas Academy, Varanasi, 2012, Part 1, Sutrasthana,4/35, p- 119
 71. <https://books.google.co.in/books?id>
 72. API, Part 1, Vol. 5, p- 50
 73. Salman et al. 2017. Exploring globally used antiurolithiatic plants of S to Z families: Including Saxifragaceae, Scrophulariaceae, Solanaceae, Urticaceae, Vitaceae, Zingiberaceae and Zygophyllaceae, *Journal of Pharmacognosy and Phytochemistry* 2017; 6(4): 1430-1436
 74. Rehna Sidharthan, Mahesh T. S, Sridevi Joshi. Review on siddhamantra with special reference to pittaghna varga. *Int. J. Res. Ayurveda Pharm.* 2013;4(5):652-655:<http://dx.doi.org/10.7897/2277-4343.04504>
 75. Charak Samhita of Maharsi Agnivesha with Ayurveda - Dipika Sanskrit Commentary by Chakrapanidutta, Tattvaparakasini Hindi Commentary of 'Ayurveda- Dipika' edited and commented by Dr. Lakshmidhar Dwivedi, Dr. B.K. Dwivedi and Dr. P.K. Goswami, Chaukhamba Krishnadas Academy, Varanasi, 2012, Part 1, Sutrasthana,4/35, p- 119
 76. Dravyaguna Vigyana by Prof. P.V. Sharma, Chaukhambha Bharati Academy, Varanasi, 2006, Vol-2, (Vegetable Drugs), p- 637
 77. API, Part 1, Vol. 5, p- 57-58
 78. P.A. Khaire et al. 2015. A pharmacognostic review on charakokta mutravirechaniya mahakashaya, *Int. J. Res. Ayurveda Pharm.*6(6), Nov-Dec 2015: 737-744
 79. Tenzin C, Jeyanthi P, Kumar A, Sujesh S and Ramalingam C* Estimation of Bioactive Compounds from *Saccharum munja* Extract for the Evaluation of Anti-oxidants and Anti- bacterial Activities, *Journal of Food Processing & Technology*.
 80. Dr. S.K. Sharma, 'Medicinal plants used in Ayurveda', edited by Prof. K.C. Chuneekar and Dr. Chote Lal Yadav, Edition 1998. India, Rastriya Ayurved Vidyapeeth, National Academy of Ayurved, 1998, Drug no. 1781, Page no. 167.
 81. Kasote DM, Jagtap SD, Thapa D, Khyade MS, Russell WR. Herbal remedies for urinary stones used in India and China: A review. *Journal of Ethnopharmacology*. 2017; 203:55-68.
 82. Doddola S, Pasupulati H, Koganti B, Prasad KVSRG. Evaluation of *Sesbania grandiflora* for antiurolithiatic and antioxidant properties. *Journal of Natural Medicines*. 2008; 62(3):300-307.

HOW TO CITE THIS ARTICLE

Deka D. Mutravirechaniya mahakashaya as a solution towards urinary disorders – A compilation on research based evaluation. *J Ayu Herb Med* 2020;6(3):194-201.