A comparative phytopharmacological review on diuretic activity of medicinal plants w.s.r. to mutravirechaniya mahakashaya and veertarvadi gana

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ABSTRACT: Ayurveda is a science which works on principle of promoting the health of healthy, subsiding the ailments of diseased & maintaining the equilibrium. Mutravaha srotas (Urinary System) and its Srotogata Vikaras (Urinary Disorders) are given special attention in Ayurveda.As a system responsible for fluid equilibrium in the body; it also detoxifies the body by excreting waste items via urine. Whenever There is Srotodushti of this system diseases such as Mutrakrichra,Mutraghata,Mutratisara, Prameha,Ashmari,shoth & so on are commonly noted. There are several herbs mentioned by our acharyas with various activities that are especially focused at alleviating urinary system diseases. Drugs like those stated by Acharya Caraka in Mutravirechniya Mahakashyaya [1] and Acharya Sushruta in Veertarvadi Gana[2]. These drugs function on the system according to their rasa panchaka; which includes rasa, guna, veerya, vipaka, and prabhava. The dravya's corresponding pharmacological activities are caused by the presence of their respective phytoconstituents. These phytochemicals can be linked to the aforementioned rasa panchaka, confirming thier effects. In the current study, the author has made serious attempts through critical analysis to shed light on the pharmacological effects of both groups i.e. Mutra Virechaniya Mahakashaya & Veertarvadi Gana, respectively on urinary system disorders.This work can be a contribution in field of pharmacotherapeutics of Urinary System Disorders.

KEYWORDS: Mutravaha srotas, Mahakshaya, Gana, Rasa,Dravya.

INTRODUCTION-

In the fourth chapter of the *Sutra Sthan (Shadvirechanshatasriya Adhayaya); Acharya Caraka* describes the 50 *mahakashayas*; each *mahakashaya* has a group of ten medicinal plants based on its primary activity. For example *Mutravirechaneeya Mahakashaya* has group of ten medicines which act as diuretics. Now these drugs can be used therapeutically as in Urolithiasis, Inflammation, Oedema, Urinary Tract Infections, Hypertension , Liver Disease, Retention of Urine etc. He refers to these medications as having pharmacological function in addition to treating diseases by their *Yukti* (applied knowledge of physician) . He is the first author in the history of medicine to classify near about 274 medicinal plants according to these *mahakashyas*, laying the foundations for pharmacology. Other than *Acharya Caraka*; the great surgeon of medical system *Acharya Sushruta* used the classification of herbs in the form of 37 *Gana*. These *ganas* has different number of medicinal plants in each *Gana*. He used the first drug name for the nomenclature of the *Gana*. He also described the therapeutic actions in the end of each *Gana* (group of medicinal plants). For example the *Veertarvadi Gana* name pick by the *Veertaru*, the first drug of *gana* and in the end of this *gana*, he described the therapeutic actions of the gana as *Vata vikara* (Neuromascular diesease), *Ashmari* (urolithiasis) , *Sharkara* (deposition of silica and other urolithiatic compounds), *mutrakrichha* (dysuria), *mutraghata* (retention of urine) , *ruja* (colic pain) [3]. In order to be clear, both *acharyas* recommended using this class of medications to treat symptomatic relief in the disease by their pharmacological activity.

Ayurvedic properties of ayurvedic diuretic medicinal plants described in *charakokta mutravirechniya mahakashaya* :

S.no.	*Dravya*	Botanical Name	Family	*Rasa*	*Guna*	*Veerya*	*Vipaka*	*Dosh*
1.	*Vrikshadini* [4]	*Dendrophthoe Falcata*	Loranthaceae	*Tikta, Kashaya, Madhur*	*Laghu, Ruksha*	*Sheeta*	*Katu*	*Kapha -Pitta* Pacifying
2.	*Shvadamshtra* [5]	*Tribulus terrestris*	Zygophyllaceae	*Madhur*	*Guru, Snigdh*	*Sheeta*	*Madhur*	*Tridosha* Pacifying
3.	*Vasuka* [6]	*Pupalia lappacea*	Amaranthaceaea	*Katu, Tikta*	*Laghu, Ruksh, Tikshn Sara*	*Ushna*	*Katu*	*Kapha -Vata* Pacifying
4.	*Vasira* [7]	*Achyranthes aspera*	Amaranthaceae	*Katu, Tikta*	*Laghu, Ruksh, Tikshn*	*Ushna*	*Katu*	*Kapha -Vata* Pacifying

					Sara			
5.	*Pashanbheda* [8]	*Bergenia ciliate*	Saxifragaceae	*Kashyay Tikta*	*Laghu, Snigdha*	*Sheeta*	*Katu*	*Tridosha* Pacifying
6.	*Darbha* [9]	*Imperata Cylinderica*	Graminae	*Madhura Kashyay*	*Laghu, Snigdha*	*Sheeta*	*Madhura*	*Tridosha* - pacifying
7.	*Kusha* [10]	*Dasmoshtachya Bipinnata*	Graminae	*Madhura Kashyay*	*Laghu, Snigdha*	*Sheeta*	*Madhura*	*Tridosha* Pacifying
8.	*Kansa* [11]	*Sachharum spontaneum*	Graminae	*Madhura Kashyay*	*Laghu, Snigdha*	*Sheeta*	*Madhura*	*Vaat -pitta* Pacifying
9.	*Gundra* [12]	*Typha angustata*	Thyphaceae	*Madhura Kashyay*	*Laghu, Snigdha*	*Sheeta*	*Madhura*	*Pitta -rakta* Pacifying
10.	*Itkata moola* [13]	*Sesbania Bispinosa*	Graminaeae	*Madhur*	*Guru, Snigdha*	*Sheeta*	*Madhura*	*Vaat -pitta* Pacifying

Table no. 01

Phytopharmacological properties of ayurvedic diuretic medicinal plants described in *charakokta mutravirechniya mahakashaya* :

S.no.	**Botanical name**	**Phytoconstituents**	**PHARMACOLOGICAL ACTION**	**Ayurvedic Therapeutics**
1.	*Dendrophthoe Falcata*	Quercitrin, Gallic acid, Chebulinic acid, Kempferol.[14]	The crude fraction of aqueous and the methanol extracts of Dendrophthoe falcate possess significant anti-inflammatory activity.(Iran J Pharm Res. 2011 Spring; 10(2): 253–259. [24]	*Vranavishapaha* [33]
2.	*Tribulus terrestris*	**Saponins**-Tigogenin, Chlorogenin **Flavenoids**- quercetin 3-*O*-glycoside, quercetin 3-*O*-rutinoside, and kaempferol 3-*O*-glycoside **Sterols**- such as β-sitosterols and stigmasterols [15]	T. terrestris has potassium and fair amoung of nitrates, and these two ions are very important tin their function from the point of view of diuresis [25]	*Ashmarihara,Prameha, Hrudarogavaatnuta* [34]
3.	*Pupalia lappacea*	alkaloids, amino acids, glycosides, flavanoids, glycosides, saponins, tannins, starch, steroids, terpenoids and coumarins. stigamasterol, β-sitosterol [16]	The methanolic extract of Pupalia lappacea leads to effective RBC membrane stabilization and protein inhibition, denaturation both contributing to invitro antiinflammatory activity. (Selvan et al., IJP, 2014; Vol. 1(9): 596-604.) [26]	*Nihantihrudrujaadhmaan Kandushooludarapchi* [35]
4.	*Achyranthes aspera*	achyranthine, hentriacontane, ecdysterone, achyranthes saponins, . Hydroquinone, sapogenin along with oleanolic acid.[17]	Administration of aqueous extract of A. aspera roots to rats prevented urolithiasis induced with ethylene glycol and reduced the growth of calcium oxalate stones. (Anshu Aggarwala et al) [27]	*Nihantihrudrujaadhmaan Kandushooludarapchi* [36] *Asrigdaraprashantyartha (sahasrayogam)* [37]
5.	*Bergenia ciliate*	flavonoids, glycosides, sterols, terpenoids,	The anti-urolithic activity of Bergenia ligulata rhizome crude aqueous-methanolic	*BastiShodhana, Yoniroga,prameha,*

		saponins hydroquinone, quercitin, bergenin, phenolic compounds leucocyanidin, gallic acid, methyl gallate, catechin and polymeric tannin [18]	extract was mediated probably by CaC2O4 crystal inhibition, diuretic, hypermagneseuric and antioxidant effects. [28]	*Ashmahrudaruja* [38] *Sharkarashishinshoolajita (Dhanwantari Nighantu)* [39]
6.	*Imperata Cylinderica*	**Saponins-**Arundoin, Cylindrin Fernenol ,Beta-sitosterol **Flavanoids-** Tricin,Caryatin **Glycosides-** Salicin [19]	A dose-dependent decrease in serum creatinine and BUN has been observed increasing ICRAE(Imperata cylindrica Root Aqueous Extract) concentrations. This shows a potential nephroprotective effect by ICRAE in terms of biochemical markers (Jonnel B. Poblete) [29]	*Mutrakruchraashmari Trishnavastiruka Pradarasrajita* [40]
7.	*Dasmoshtachya Bipinnata*	Coumarins (scopoletine and umbelliferone), carbohydrates, sugars, proteins, amino acids, alkaloids, tannins, phenolics, flavonoids, triterpenoids and glycoside.[20]	The hydroalcoholic extract showed significant diuretic activity,it increased the urinary output at 500 mg/kg when the effect was compared with that of the standard frusemide (P< 0.01). Moreover, this extract was found to be effective in increasing urinary electrolyte concentration (Na+, K+, and Cl-). (Golla U et al) [30]	*Mutrakruchraashmari Trishnavastiruka Pradarasrajita* [41]
8.	*Saccharum spontaneum*	alkaloids, carbohydrates and glycosides, phenolic compounds, saponins, tannins, protein and amino acids, coumarins & flavonoids [21]	The ethanolic root extract of S.spontaneum exhibits potent antiurolithiatic activity. (M.Sathya et. Al) [31]	*Mutrakruchraashma Daahasrakshaya Pittarogajita.* [42]
9.	*Typha angustata*	Tannins, Triterpene **,Flavanoids-** Naringenin, Isorhanetin **Sterols-** Alpha-sitosterol Cholesterol [22]	The hydroalcoholic extract of rhizomes of Typha angustata is taken for the antibacterial against *B.subtilis(17mm), P.aureginosa(16mm), E.coli(20mm)* and *S.aureus(16mm)* (K.V.S.Santoshkumar et al) [32]	*Stanyashukraraj Mutrashodhano, Mutrakruchrahruta* [43]
10.	*Sesbania Bispinosa*	Amino acids such as-lysine, arginine, histidine. [23]	_ _	*Mutravirechana, Vaat-Pittahara, Stanyajanan* [44]

Table no. 02

Ayurvedic properties of ayurvedic diuretic medicinal plants described in *sushrutokta veertarvadi gana*:

S.No.	*Dravya*	Botanical Name	Family	*Rasa*	*Guna*	*Veerya*	*Vipaka*	*Dosha*
1.	Veertaru [45]	*Terminalia Arjuna*	Combretaceae	*Kashyay*	*Laghu Ruksha*	*Sheeta*	*Katu*	*Kapha Pitta* Pacifying
2.	Shvet Sehchara [46]	*Barleria Cristata*	Acanthaceae	*Tikta,Madhur*	*Laghu*	*Ushna*	*Katu*	*Kapha Vaat* Pacifying
3.	Pita Sehchara [47]	*Barleria Prionitis*	Acanthaceae	*Tikta,Madhur*	*Laghu*	*Ushna*	*Katu*	*Kapha Vaat* Pacifying
4.	Darbha [09]	*Imperata Cylinderica*	Graminae	*Madhura Kashyay*	*Laghu, Snigdha*	*Sheeta*	*Madhura*	*Tridosha* - Pacifying
5.	Vrikshadani [01]	*Dendrophthoe Falcata*	Loranthaceae	*Tikta, Kashaya, Madhur*	*Laghu, Ruksha*	*Sheeta*	*Katu*	*Kapha -Pitta* Pacifying
6.	Gundra [12]	*Typha Angustata*	Thyphaceae	*Madhura Kashyay*	*Laghu, Snigdha*	*Sheeta*	*Madhura*	*Pitta -rakta* Pacifying
7.	Nala [48]	*Arundo Donax*	Poaceae	*Madhura Kashyay, Tikta*	*Laghu, Snigdha*	*Sheeta*	*Madhura*	*Vaat -Pitta* Pacifying
8.	Kusha [10]	*Dasmostachya bipinnata*	Poaceae	*Madhura Kashyay*	*Laghu, Snigdha*	*Sheeta*	*Madhura*	*Tridosha* Pacifying
9.	Kasha [11]	*Saccharum spontaneum*	Graminae	*Madhura Kashyay*	*Laghu, Snigdha*	*Sheeta*	*Madhura*	*Vaat -pitta* Pacifying
10.	Ashmabhedak [08]	*Bergenia ciliate*	Saxifragaceae	*Kashyay Tikta*	*Laghu, Snigdha*	*Sheeta*	*Katu*	*Tridosha* Pacifying
11.	Agnimantha [49]	*Premna mucronate*	Lamiaceae	*Tikta Katu Kashyay Madhur*	*Laghu, Ruksha*	*Ushna*	*Katu*	*Kapha Vaat* Pacifying
12.	Morat [50]	*Marsdenia tinacissima*	Asclepiadaceae	*Tikta, Kashyay*	*Guru, Ruksha*	*Ushna*	*Katu*	*Tridosha* Pacifying
13.	Vasuka [06]	*Pupalia lappacea*	Amaranthaceaea	*Katu, Tikta*	*Laghu, Ruksh, Tikshn Sara*	*Ushna*	*Katu*	*Kapha -Vata* Pacifying
14.	Vasira [07]	*Achyranthes aspera*	Amaranthaceaea	*Katu,s Tikta*	*Laghu, Ruksh, Tikshn Sara*	*Ushna*	*Katu*	Kapha -Vata Pacifying
15.	Bhalooka [51]	*Oroxylum indicum*	Bignoniaceae	*Madhura, Tikta, Kashyay*	*Laghu, Ruksha*	*Ushna*	*Katu*	*Kapha Vaat* Pacifying
16.	Kurantaka [52]	*Barleria strigose*	Acanthaceae	*Tikta,Madhur*	*Laghu*	*Ushna*	*Katu*	*Kapha Vaat* Pacifying
17.	Indivar [53]	*Nymphaea caerulea*	Nymphaeaceae	*Kashyay, Madhur, Tikta*	*Laghu, Snigdha, Pichhila*	*Sheeta*	*Madhura*	*Kapha Pitta* Pacifying
18.	Kapotvanka [54]	*Bacopa monnieri*	Plantaginaceae	*Tikta*	*Laghu*	*Ushna*	*Katu*	*Kapha Vaat* Pacifying
19.	Shvadamshtra [05]	*Tribulus terrestris*	Zygophyllaceae	*Madhur*	*Guru, Snigdh*	*Sheeta*	*Madhur*	*Tridosha* Pacifying

Phytopharmacological properties of ayurvedic diuretic medicinal plants described in *charakokta mutravirechniya mahakashaya* :

Table no. 03

S.no.	Botanical name	Phytoconstituents	PHARMACOLOGICAL ACTION	Action
1.	*Terminalia Arjuna*	Polyphenols, flavonoids, tannins, triterpenoids, saponins, sterols and minerals. amino acids like tryptophan, tyrosine, histidine & cysteine,Arjunin, Arjunic acid, Terminic acid,Arjunolic acid.[55]	Inhibit CaP mineralization and COM crystal growth in vitro.(Chaudhary, et al.:) [74] Nephro-protective activity of isolated methanol fractions phyto-compound from bark of terminalia arjuna) (Shreya mandal et. Al) [75]	*Hrudyakshatkshay asrajita, Medomehavranan hanti.* [93] *Hrudyaroga jeernajwara, raktapittahanti Bhagna (Chakradatta)* [94]
2.	*Barleria Cristata*	Flavonoids, quinones, iridoids, phenylethanoid glycosides, the immunostimulant "Sankaranin".[56]	Methanol and aqueous extract of *B.cristata* leaves showed maximum inhibition in histamine and serotonin-induced rat paw oedema animal model(Gambhire M et al.) [76]	*Kusthavaatasrakapha Kanduvishapha, Kesharanjana* [95]
3.	*Barleria Prionitis*	Phenylethanoid glycoside-barlerinoside, barlerin, acetylbarlerin, lupulinoside, 7-methoxydiderroside[57]	B. prionitis whole plant possess significant nephroprotective activity against adriamycin-induced nephrotoxicity in Wistar rats.(A.M.S.S. Amarasiri et al.) [77] B.prionitis showed significant anti hypertensive effect in DOCA salt induced hypertensive rats in dose of 200mg/b.w and 400mg/b.w. (Bhavna Marya et al.) [78]	*Kusthavaatasrakapha Kanduvishapha, Kesharanjana* [96]
4.	*Imperata Cylinderica*	***Saponins-****Arundoin, Cylindrin Fernenol ,Beta-sitosterol* ***Flavanoids-*** Tricin,Caryatin ***Glycosides-*** Salicin [58]	Leaves of *I. cylindrica* possessed an antihypertensive action with a significant dose-dependent reduction in amplitude of contraction of smooth muscle cells of rabbit jejunum in comparison with standard antihypertensive drug, adrenaline. (Mak-Mensah E.E et al.) [79]	*Mutrakruchraashmari Trishnavastiruka Pradarasrajita* [97]

5.	*Dendrophthoe Falcata*	Quercitrin, Gallic acid, Chebulinic acid, Kempferol [59]	Petroleum , ether, chloroform and ethanolic extracts exhibits significant antimicrobial activity against *Staphylococcus aureus, Staphylococcus pyogenes, Escherichia coli* [80]	*Vranavishapaha* [98]
6.	*Typha Angustata*	Tannins, Triterpene **,Flavanoids-**Naringenin, Isorhanetin **Sterols-** Alpha-sitosterol Cholesterol [60]	The Anti-inflammatory activity in Carrageenan induced hind paw edema. of Typha angustata methanol extract is due to the bioactive principles of methanol extract of inflorescence (C.R.Pawar et al) [81]	*Stanyashukraraj Mutrashodhano, Mutrakruchrahruta* [99]
7.	*Arundo Donax*	rhamnose 0.15 %, mannose 0.35 %, arabinose 2.00 %, galactose 0.84 %, xylose 33.88 %, glucose 62.13 %, 4-O-methyl glucuronic acid 0.65% [61]	The antimicrobial effects of 4% methanolic extracts of Arundo donax were comparable to Cephalotin (30mcg), Piperailin (30mcg) and Amikacin (30mcg) against Escherichia coli and Piperacilin (30mcg) and Amikacin (30mcg) against Pseudomonas aeruginosa. (Shirkani A, et al) [82]	*Kapharaktajita* [100] *Pitaamutravinashna (Dhanvantar Nighantu)* [101]
8.	*Dasmostachya Bipinnata*	coumarins (scopoletine and umbelliferone), carbohydrates, sugars, proteins, amino acids, alkaloids, tannins, phenolics, flavonoids, triterpenoids and glycoside.[62]	Ethanolic root extract possessed antibacterial activity against *Escherichia coli, Klebsiella pneumoniae* and *S. aureus.* (Shrestha A. et al) [83]	*Mutrakruchraashmari Trishnavastiruka Pradarasrajita* [102]
9.	*Saccharum spontaneous*	alkaloids, carbohydrates and glycosides, phenolic compounds, saponins, tannins, protein and amino acids, coumarins & flavonoids. [63]	The effect of the alcoholic extract of Saccharum spontaneum (Poaceae) against glycolic acid induced urolithiasis urolithiasis in albino rats (Sathya M. et al) [84]	*Mutrakruchraashma Daahasrakshaya Pittarogajita.* [103]
10.	*Bergenia Ciliate*	flavonoids, glycosides, sterols, terpenoids, saponins hydroquinone, quercitin, bergenin, phenolic compounds leucocyanidin, gallic acid, methyl gallate, catechin and polymeric tannin [64]	Ethanolic extracts of root of *Bergenia ligulata* wall were assessed for diuretic activity in albino rats that was compared with standard drugs **(**Poonam Verma et al) [85]	*BastiShodhana, Yoniroga,prameha, Ashmahrudaruja* [104] *Sharkarashishinshoolajita (Dhanwantar Nighantu)* [105]

11.	*Premna Integrifolia*	p-methoxy cinnamic acid, linalool, linoleic acid, β-sitosterol and flavone luteolin, iridoid glycoside, premnine, ganiarine and ganikarine, premnazole,aphelandrine, pentacyclicterpenebetulin,caryophellen, premnenol, premnaspirodiene, clerodendrin-A, [65]	Analgesic and antibacterial (Utpal kumar et al., 2011) (Aliqur Rahman et al., 2011) [86]	*Shvyathunuta, Pandunuta,agnida* [106] *Vibandhas ch vinashyaet (Dhanvantry Nighantu)* [107]
12.	*Marsdenia Tinacissima*	dihydrosarcostin, daucosterol, 3-O-acetyl-oleanane-18-ene-3β-ol, condutirol, β-sitosterol, and stigmasterol [66]	_ _	*Hrudarogakaphavaathrut, Vamipramehakushthaari (Raj Nighantu)* [108]
13.	*Pupalia Lappacea*	alkaloids, amino acids, glycosides, flavanoids, glycosides, saponins, tannins, starch, steroids, terpenoids and coumarins. Stiga62 masterol, β-sitosterol. [67]	The methanolic extract of Pupalia lappacea leads to effective RBC membrane stabilization and protein inhibition, denaturation both contributing to invitro antiinflammatory activity. (Selvan et al., IJP, 2014; Vol. 1(9): 596-604.) [26]	*Nihantihrudrujaadhmaan Kandushooludarapchi* [109]
14.	*Achyranthes aspera*	achyranthine, hentriacontane, ecdysterone, achyranthes saponins, Hydroquinone, sapogenin along with oleanolic acid. [68]	Inhibiting CaOx nucleation and growth in vitro and also exhibited reduction in oxalate induced injury on renal epithelial cells, NRK 52E. (Aggarwal A et. Al)[87] S.S. Gupta et al. (1972) reported a saponin isolated from the seeds of Achyranthes aspera which shows significant diuretic effect in adult male albino rats . [88]	*Nihantihrudrujaadhmaan Kandushooludarapchi* [110] *Asrigdaraprashantyartha (sahasrayogam)* [111]
15.	*Oroxylum Indicum*	Stem bark of Oroxylum indicum, three flavanoids namely baicalein, oroxylin and pinostrobin along with one sterol, Stigmast-7-en-3-ol, Baicalein and oroxylin. [69]	The ethanolic extract of roots of Oroxylum indicum has shown protective effect against cisplatin-induced renal injury in Wistar male albino rats.(Sreedevi Adikay et al.) [89]	*Anilshleshmapitta Kasaamanaashana* [112]

16.	*Barleria Strigose*	p-hydroxycinnamic acid, p-coumaric acid, α-tocopherol, melilotic acid, syringic acid, vanillic acid, and p-hydroxybenzoic acid , aromatic compound 4-hydroxy-trans-cinnamate derivative found in Barleria was isolated from B. cristata.[70]	Leaf extracts were tested for their antimicrobial activity against five pathogenic bacteria (Bacillus subtilis, Escherichia coli, Micrococcus luteus, Pseudomonas aeruginosa and Staphyloccus aureus)[90]	*Kusthavaatasrakapha Kanduvishapha, Kesharanjana* [113]
17.	*Nymphaea Caerulea*	flavonoids, steroids, terpenoids, tannins, glycosides, saponins, alkaloids, phenols, quinones, lignin, coumarins, leucoanthocyanins and emodins.[71]	– –	*Trishnadaahaasravisphota Vishavisarpa naashanm* [114]
18.	*Bacopa monnieri*	alkaloid brahmine, nicotinine, herpestine, bacosides A and B, saponins A, B and C, triterpenoid saponins, stigmastanol, β-sitosterol, betulinic acid, D-mannitol, stigmasterol, α-alanine, aspartic acid, glutamic acid, and serine and pseudojujubogenin glycoside. [72]	Oral Bacopa monnieri in male wister rats extract elicited endothelial independent vasorelaxation, suggesting that it acts directly on the vascular smooth muscle cells.(Amnart Onsa-ard et al)[91]	*Medhyahrudya ch kusthaghni jwaraghni,kaphavaatjita* [115]
19.	*Tribulus terrestris*	**Saponins**-Tigogenin, Chlorogenin **Flavenoids**- quercetin 3-*O*-glycoside, quercetin 3-*O*-rutinoside, and kaempferol 3-*O*-glycoside **Sterols**- such as β-sitosterols and stigmasterols [73]	10 mg/kg/day of the aqueous extract of the T.terrestris fruit have shown antihypertensive effects in an animal trial. (Sharifi AM et al)[92]	*Ashmarihara,Prameha, Hrudarogavaatnuta* [116]

Table no. 04

DISCUSION AND RESULTS:

Diuretics (natriuretics) are drugs which cause a net loss of Na+ and water in urine. However, Na+ balance is soon restored, even with continuing diuretic action, by compensatory homeostatic mechanisms of the body, albeit with a certain degree of persisting Na+ deficit and reduction in extracellular fluid volume.

1. High efficacy diuretics (Inhibitors of Na+-K+-2Cl^{-} cotransport) Sulphamoyl derivatives like Furosemide, Bumetanide, Torasemide.

2. Medium efficacy diuretics (Inhibitors of Na+-Cl^{-} symport) (a) Benzothiadiazines (thiazides)Hydrochlorothiazide, Benzthiazide,Hydroflumethiazide, Bendroflumethiazide (b) Thiazide like (related heterocyclics)Chlorthalidone, Metolazone, Xipamide,Indapamide, Clopamide .

3. Weak or adjunctive diuretics (a) Carbonic anhydrase inhibitors-Acetazolamide

(b) Potassium sparing diuretics -(i) Aldosterone antagonist: Spironolactone, Eplerenone

(ii) Inhibitors of renal epithelial Na+ channel: Triamterene, Amiloride.

(c) Osmotic diuretics-Mannitol, Isosorbide, Glycerol

4.Other high ceiling diuretics, viz. ethacrynic acid and organomercurials (mersalyl) are only historical. [117]

In *Ayurvedic* medical system, Diuretics are known as *mootra virechniya dravyas* or *mootral dravyas*. They are beneficial in *ashmari* (urolithiasis), *mootraghata* (urine retention), *mootrashmari* (kidney stones), *shothhara* (anti-inflammatory), and many other conditions. The diuretics were detailed by *Aacharya Caraka* and *Aacharya Sushruta* in *Mootravirechanya mahakashyaya* and *Veertarvadi gana*, respectively. The goal of this review is to conduct a critical examination of these *gana* and *mahakashyaya*. *Dravyas* have pharmacological activities such as diuresis, anti-uroliothiatic, anti-inflammatory, cardiac activity, analgesic, and anti-colic. The activity of these *dravyas* in ayurveda can be elaborated by the ayurvedic attributes *Rasa, Guna, Veerya, Vipaka* and *Prabhava*.

CONTROVERSIAL DRUGS –

Moorva is regarded as a controversial drug;among the aforementioned *dravyas*. It could, however be *Marsdenia tinacissima*. Also no significant activity that might support its diuretic properties could be identified. *Indiver* is regarded as blue variety of nymphea; Preparation made by this drug as the name of '*kamalanala kshar*' is used for diuresis pourpose.

COMMON DRUGS AMONG BOTH THE GROUPS-

The data was collected from 29 plants. There are 9 plants that are shared by gana and mahakashaya. As a result, the final data was derived from 20 medicinal plants.

S.no.	Drug	Latin Name
1.	*Vrikshadini*	*Dendrophthoe Falcata*
2	*Shvadamshtra*	*Tribulus terrestris*
3.	*Vasuka*	*Pupalia lappacea*
4.	*Vasira*	*Achyranthes aspera*
5.	*Pashanbheda*	*Bergenia ciliate*
6.	*Darbha*	*Imperata Cylinderica*
7.	*Kusha*	*Dasmoshtachya Bipinnata*
8.	*Kasa*	*Sachharum spontaneum*

Table no. 05

DIVISION UPON THE BASIS OF RASA AND GUNA-

When we look at the statistics based on the *Pradhan rasas* of the 20 *dravyas*, we see that *Madhura dravyas* are the most numerous, with 8 (40%), *Tikta* are 7 (35%), *Kashaya* are 3 (15%), and *Katu* are 2 (10%), with no *dravya* belonging to *amla* or *lavan rasa*.

Based on the statistics presented above, we may deduce that the *Madhura rasa dravya* increases *kapha* or *jalaayasnsh* in the body (water fluid) and increases urine production. While the *tikta rasa dravyas* have certain active components that pharmacologically demonstrate diuretic action. Fewer *dravyas* contain *Kashaya rasa*, which increases *vata dosha* and works on *ashamari*, which is *vata kapha pradhan* illness. *Katu rasa dravyas* were also utilised in extremely small quantities (only 10%) as *Kshar*, which had *tikshna guna* and served as a diuretic due to its high potassium content. No one dravya placed to prominently *amla* and *lavana rasa*, which indicate the knowledge of *acharyas* towards osmotic imbalance by these type of *rasas*. As these *rasas* can be a cause of oedema and hypertension.

When we look at the statistics, we can see that *Laghu*, *Snigdha*, *Ruksha*, and *Guru* are the most prominent *gunas* of these *dravyas*, with 18 (49%), 9 (24%), 7 (19%), and 3 (8%) respectively.

According to the data shown above, the *laghu* and *snigdha* have the largest percentage of *dravyas*, accounting for 73% of the total. *Laghu* and *Singdha drvaya* increase fluid in the body and act as diuretics.

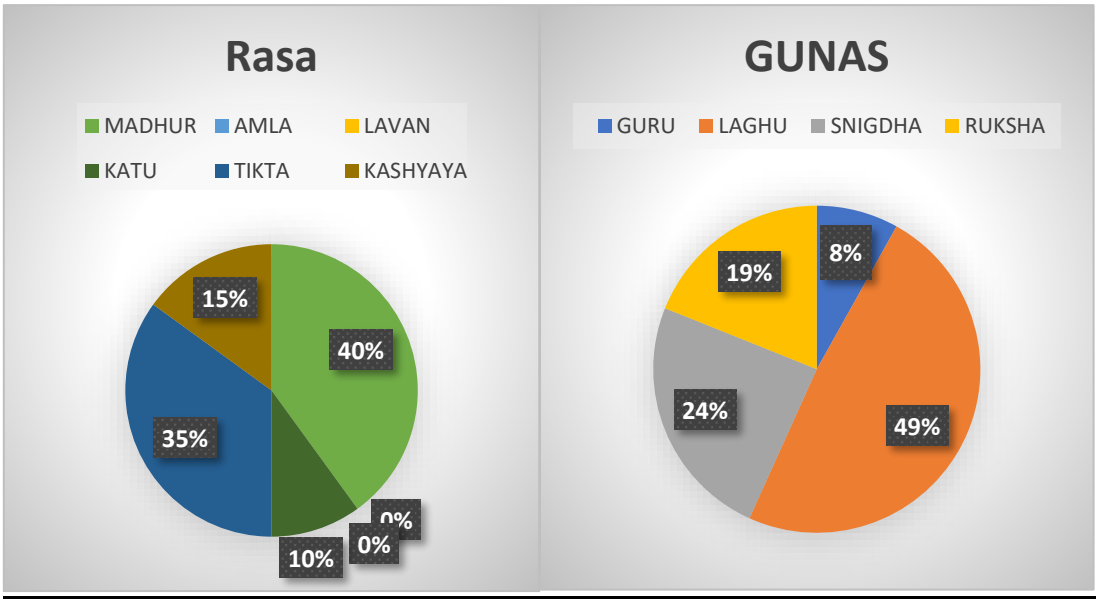

Fig. no. 01

DIVISION UPON THE BASIS OF VEERYA AND VIPAKA

When we look at the statistics, we see that the *Veerya* of 20 *dravyas* is high in *sheeta* (55%) and somewhat lower in *ushna* (45%).This evidence suggests that various *dravyas* function throughtheir active principles such as-Glycosides,Alkaloids,Sterols,Potassium,Nitrates,Amino acids,Terpenoids,Saponins and so on.

When we look at the data, we see that the *vipaka* of 20 *dravyas* is predominantly *katu* in nature (60%) while the remaining (40%) are *Madhura* in *vipaka.* This suggests that the majority of *dravyas* are easy/light to digest.

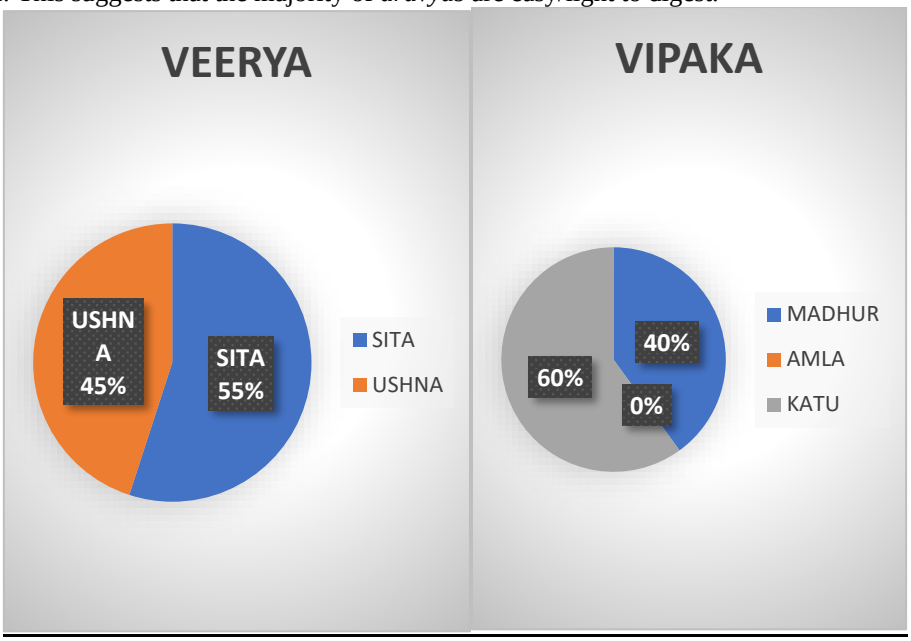

Fig. no. 02

All the data indicate that ayurvedic pharmacodynamic activity of diuretics are quite impressive in present scenario also.

CONCLUSION-

It can be inferred that drugs targeting the *mutrveha srotas* (urinary system) like of *mutravirechniya mahakashaya* and *veertarvadi gana* have significant activities such as diuresis, anti-uroliothiatic, anti-inflammatory, cardiac activity, analgesic, and anti-colic.These drugs acts specifically on the basis of their ayurvedic attributes(*rasa panchaka*) i.e. *rasa, guna, veerya, vipaka* and *prabhava*. The body's *kapha* or *jalaayasnsh* (water fluid) is increased by the *Madhura rasa dravya*, which also causes an increase in urine output. *Laghu* and *Singdha dravya* does diuresis by increasing more fluid in body. According to data from *sheet virya*, different *dravyas* operate via their active principles. *Katu Vipaka* adds on the activity via its ability of *Laghuta*.Ayurvedic Pharmacodynamics of these drugs demonstrates that they are effective according to current standards as well.

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