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Research Article

AN EXPERIMENTAL EVALUATION OF *HARITAMANJARI* (*ACALYPHA INDICA* LINN) FOR *MUTRALA KARMA* W.S.R TO DIURETIC ACTIVITY

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ABSTRACT

Diuretics are widely employed drugs used to treat extra cellular fluid volume expansion caused due to renal, cardiac, liver disorders etc. These diuretics are effective but have side effects. *Acalypha Indica* Linn is a herb of Euphorbiaceae family, found throughout India as a weed. Many studies have been carried out but sufficient data is not available to establish its diuretic activity. Hence the study is focused on the assessment of *Harita Manjari* for its diuretic action in animal model.

Methods: The trial drugs are administered for 7 days prior to the day of evaluation of diuretic action; the rats were individually placed in the metabolic cages to collect urine. The volume of the urine collected in graduated vials was measured after 6 hours and expressed in terms of ml/100gm of body weight.

Results: The invivo study demonstrated that crude suspension of *Harita Manjari* in a dose of 450mg/kg has significant diuretic activity.

The statistical analysis has been carried out and results on continuous measurements are presented on Mean ± SEM were calculated. Urine output, pH and urine electrolytes were compared with control groups by one-way ANOVA followed by Dunnett's multiple comparison test. The P Value <0.05 were considered as statistically significant.

Conclusion: Order of diuresis: Crude suspension >Alcoholic extract >Aqueous extract.

KEYWORDS: *Haritamanjari*, Acalypha Indica, *Mutrala*, diuretics, Metabolic cage.

INTRODUCTION

Mutravirechaniya Dravyas are drugs which acts by promoting the flow of urine and cleanses *Mutravaha Srotas* without hampering the fluid balance and electrolytes. The homeostasis is hampered during condition like *Mutrakrichra, Mutraghata, Ashmari, Shotha,* and other urinary disorders. In such cases diuretics are used.[1,6,8] The modern therapeutics has high, moderate and low efficacy diuretics which are effective but have side effects like hyponatreia, hypokalemia, gout, hyperglycemia etc.

So there is a need of a drug which fulfills the above criteria along with cost effectiveness and easy availability.[1]

Although various studies have been carried out with respect to various parts of *Harita manjari* plant but not much data is available to establish diuretic activity.

There is no description regarding *Harita manjari* in any of the *Bruhatrayis* or *laghuthrayis* (treatises).

First description regarding *Harita manjari* is mentioned in the text book of Vaidyamanoram evam dharakalpa[7], as one of the ingredient in *Punarnavadi churna* for *Dantaroga* (dental diseases) by Vaidyavara shri Kalidasa.

Acharya Bhavamishra has mentioned *Haritamanjari* in *Bhava prakasha nighantu*[2] (Lexicon), as *Kaphaghna, Mootrala, Vamaka Sramsana, Krimigna* and *Twak Doshahara* under *Parishishta Varga*, drug no. 90.

MATERIALS & METHODS

Collection of the trial drugs: *Dhanvantari vana*, Bangalore University, Bangalore.

Drug authentication: by Dr. Ganeshbabu Ph.D., Botanist, FRLHT, Yelahanka, Bangalore.

Preparation of the drugs: *Harita manjari* leaves washed and dried in shade then ground into fine powder.

Preparation of the extract: Soxhlet Apparatus

- Aqueous and Alcoholic (Ethanol) extracts by continuous hot extraction.
- Extract obtained in the form of semisolid was stored in air tight container.

Objectives of the Study

- To evaluate Diuretic activity of *Harita manjari* (*Acalypha Indica* Linn*)* in animal model.

Grouping

Equipment: Orchid scientific metabolic cages

Preparation and maintenance of cage: OECD Guidelines were followed

Examination of the animals prior to the experiment: The animals were randomly selected and kept in their cages for at least 5 days prior to dosing to allow for acclimatization to the laboratory conditions.

Mice: Polypropylene cages 9 with provision for water bottle holder and feed hopper with corn cobs as bedding material.

Diet: ***ad libitum***- Pelleted rodent feed (Teklad global, 14% protein, maintenance feed).

Water: ***ad libitum***- Deep bore well water passed through charcoal filters and exposed to UV rays and water in polypropylene water bottles were provided to the animals.

Identification: By cage card, crystal violet/picric acid color body marking.

Route of Administration: Oral

Vehicle for administration of drug: 2% gum acacia solution was used as vehicle.

Treatment age: 7-8 weeks, weighing 100–200gm.

Table: 1 Showing grouping of 30 rats

	Group	Drug
1.	Control Group	Distilled water
2.	Standard Group	Furosemide (10mg/kg body wt.)
3.	Aqueous extract of *Harita manjari*	200mg/kg body wt
4.	Alcoholic extract of *Harita manjari*	200mg/kg body wt
5.	Crude form of *Haritha manjari*	450mg/kg body wt

Dose: Based on the API standards human dose of *Churna* (powder) is 3-6gm. Human Dose × Body surface area ratio convertibility factor (0.018)= 'x' gms/200gm of rat. Thus crude drug dose was fixed to be 450mg.

Experimental Trial Proper [5,9]

SD rats weighing 100–200 g are used. On the day of starting of the drug treatment, the rats were individually placed in the metabolic cages to collect urine. The metabolic cages provided with a wire mesh bottom and a funnel to collect the urine. Stainless steel sieves are placed in the funnel to retain feces and to allow the urine to pass.

Fifteen hours prior to the experiment food and water are withdrawn. For screening procedures 5 groups of 6 animals are used for dose of the test compound.

Task: collection of 6 hour urine output.

The trial drugs were administered for 7 days prior to the day of evaluation of diuretic action.

The volume of the urine collected in graduated vials was measured at the end of 6 hours and expressed in terms of ml/100gm of body weight.

Parameters: Urine volume, Urine pH, Urine Electrolytes.

RESULTS AND DISCUSSION

Group	Animal.no	Urine volume	Urine Ph	Urine Na mmol/L	Urine K mmol/L
Control	1	1.2	8.1	118.6	53.9
	2	1.5	8	121.3	58.4
	3	0.5	7.9	114.5	54.9
	4	1.4	7.8	116.2	59.7
	5	2.1	8	108.6	51.9
	6	2.2	8.2	110.8	54.7
Mean		1.5	8.0	115.0	55.6
SME		0.6	0.2	3.7	0.6
Standard	7	3.4	8.1	148.6	82.1
	8	2.6	8.2	157.6	84.6
	9	3.6	8.3	162.4	81.3

	10	2	8.4	158.6	83.4
	11	3.5	8.1	154.9	85.7
	12	4	8.5	163.8	86.9
Mean		2.0	8.4	141.5	72.4
SME		0.6	0.1	3.2	0.3
Aqueous Extract	13	0.4	8	147.5	72.4
	14	4	7.9	142.7	71.6
	15	1.5	8.1	138.9	73.4
	16	2.2	9.1	151.7	72.9
	17	1.6	8.9	154.4	74.6
	18	0.3	9.2	164.2	75.8
Mean		1.7	8.5	149.9	73.5
SME		0.6	0.2	3.7	0.6
Aloholic Extract	19	0.5	8.2	139.4	71.9
	20	1	8	141.5	72.8
	21	2	8.2	136.7	71.5
	22	5	8.6	130.9	73
	23	1.5	8.9	147.6	71.8
	24	2	8.7	152.7	73.6
Mean		2.0	8.4	141.5	72.4
SME		0.6	0.1	3.2	0.3
Crude Suspension	25	1.5	8	128.6	73.8
	26	1	8.2	118.4	68.4
	27	1.4	8.1	121.4	64.9
	28	1.5	8.9	134.1	72.5
	29	3.6	8.6	123.8	66.1
	30	4	9	110.9	61.2
Mean		2.2	8.5	122.9	67.8
SME		0.5	0.2	3.3	1.9

Table 2: Results

Parameter	Control	Standard	Aq.Extract	Al.Extract	Crude Suspension
Urine volume	1.5	3.2	1.7	2.0	2.2
Urine Ph	8	8.3	8.5	8.4	8.5
Urine sodium in mmol/L	115	157.7	149.9	141.5	122.9
Potassium in mmol/L	55.6	84	73.5	72.4	67.8

Order of Diueresis

Standard > Crude suspension > Alcoholic extract > Aqueous extract > Control

Statistical Analysis

Descriptive and inferential statistical analysis has been carried out in the present study Average of all the data were compiled and Results on continuous measurements are presented on Mean ± SEM were calculated. Urine output, pH and urine electrolytes were compared with control groups by one-way ANOVA followed by Dunnett's multiple comparison test. Values <0.05 were considered as statistically significant.

Images

Acalypha indica

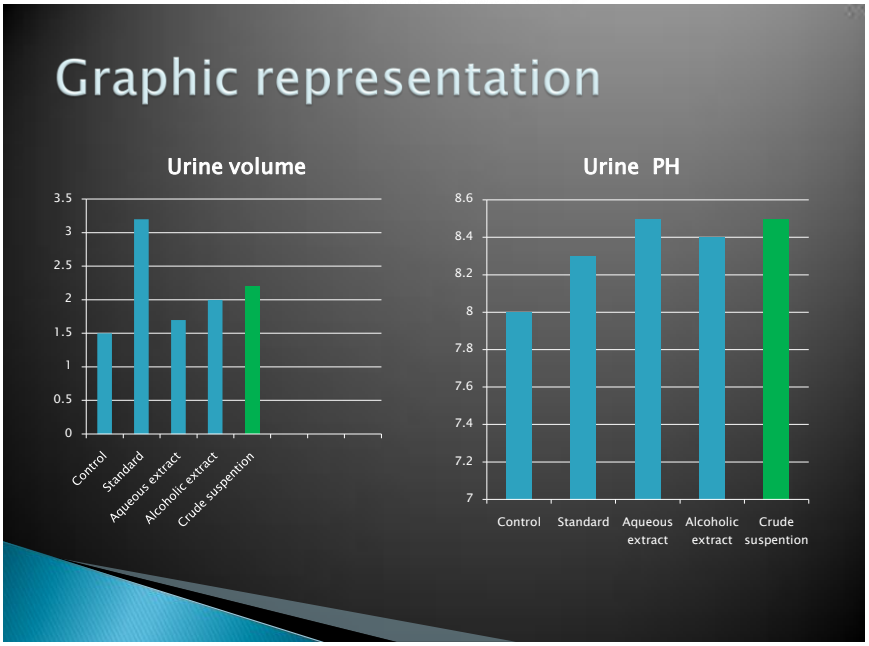
Inflorescence

Soxhlet Apparutus

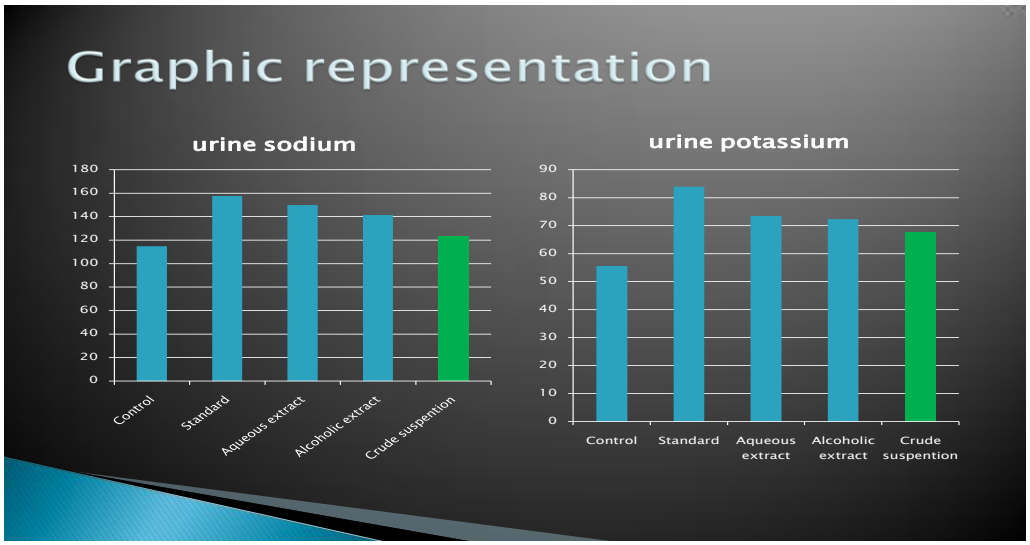
Metabolic cages: ORCHID SCIENTIFIC

Al & Aq Extracts Acalypha leaf powder

Urine volume ml	Urine Ph



Urine Sodium mmol/L	Urine Potassium mmol/L



DISCUSSION

It is mentioned that some drugs act by means of *Rasa* other by *Veerya* and other by *Guna, Vipaka* or *Prabhava* (innate properties of drug).

In addition some substances either migrate or aggravate the *Doshas* by their own self (*Dravya)*.

Due to *Basti Shodhaka* and *Mutrala* properties these may eliminate the *Mutra Visha* (toxic wastes) and detoxifies the blood.

Rasa Panchaka [6, 8]

- *Rasa- Kashaya Tikta Madhura*
- *Guna- Laghu Ushna Ruksha*
- *Veerya- Ushna*
- *Vipaka- Katu*
- *Prabhava- Vamaka Kaphaghna*

Bye the virtue of [3]

Rasa

Kashaya- Lekhana- Pitta kapha shamaka,

Tikta- Deepana, Pachana, Lekhana- Pitta kapha shamaka,

Madhura- Vishahara, Daha prashamana- Pitta shamaka.

Guna

Laghu- Lekhana, Kledaachushana, Uparopan- Kaphavata shamaka.

Ushna- Pachan, Kapha Vilayan- Kaphavata shamaka

Ruksha-Uparopan- Kapha shamaka.

Veerya

Ushna veerya- Pachan, Kapha Vilayan- Kaphavata shamaka

Vipaka

Katu Vipaka- Acharya Chakrapaani comments on Charaka sutra 25th chapters 9-11th *Shlokas* that *"Nishtapaaka malarupataya utpad"* (during the second stage of metabolism *Kapha* and *Pitta Doshas* are increased in the form of metabolic wastes and not as aggravated *Doshas*).

Phytoconstituents [10-12]

Although Tannins, β-sitosterol, acalyphamide, aurantiamide, succinimide, triterpinoid, saponin are present, the following were the phytoconstituents that is responsible for the diuretic activity of *Acalypha Indica***.**

Sugar- Due to their osmotic activity these substances oppose the reabsorption of water from the glomerular filtrate. These substances produce more elimination of water than sodium, and hence produce diuresis

Acalyphin- The aerial parts contain a cyanogenic glycoside called acalyphin (a 3-cyanopyridone derivative).

Flavonoids- Such as kaempferol, glycosides, mauritianin, clitorin, nicotiflorin, and biorobin.

Flindersin- A pyranoquinolinone alkaloid have also been isolated.

Spironolactone- which is a diuretic steroid.

Order of Diueresis In Trial Groups

Crude suspension > Alcoholic extract > Aqueous extract**.**

- The above order of activity indicates the presence phytochemical constituents in crude suspension which were probably absent when extracted with water and ethanol.
- Further, successive extraction with solvents like chloroform and methanol (in the order of polarity) may result in extraction of phytoconstituents which may show better efficacy.

- In this study it was found that the crude drug suspension showed significant increase in urine output, sodium and potassium levels when compared against control and it was comparable to furosemide which was used as standard drug in the study.
- Alcoholic and aqueous extracts also displayed diuretic activity as compared against control but did not appear to be significant.

CONCLUSION

The study demonstrated that crude drug suspension of Harita manjari in a dose of 450 mg/kg has significant diuretic activity.

- Order of diuretic activity (Urine output)

Crude suspension > Alcoholic extract > Aqueous extract.

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