

MODIFICATION OF HARIDRADI VARTI INTO EYE DROPS IN DIFFERENT METHODS AND ITS PRELIMINARY ANALYTICAL EVALUATION

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ABSTRACT

Ayurveda describes a variety of dosage forms, including Churna, Vati, Avaleha, Modaka, Asava-Arishta etc. The colour and flavour of Ayurvedic medications are gaining popularity in society. Arka Kalpana, being one among the Panchavidha Kashaya Kalpana explained in Ravana's Arka Prakasha is considered as more potent, easily administrable, and more sterile form compared to Varti. Haridradi Varti is a unique herbal preparation coming under Netra Roga Chikitsa of Bhaishajya Ratnavali. As Netra Varti is said to be applied by rubbing with liquid media, there are more chances of contamination. With innovation of technology, people prefer cost effective and easily applicable dosage forms. As there are not much eye drops in ayurvedic formulations and medication in Arka form is more convenient for application than a netra Varti. Based on the assessment of analytical parameters gomutra bhavita Dravya arka can be considered as most preferred option.

KEYWORDS: Netra Varti Kalpana, Modification, New dosage form, Arka Kalpana, ocular therapeutics.

INTRODUCTION

Medicines used externally in the eyes come under category of Varti, Netra Bindu and Anjana. Arka Kalpana, being one among the Panchavidha Kashaya Kalpana explained in Ravana's Arka Prakasha is considered as more potent^[1], easily administrable, and more sterile form compared to Varti. Varti is a derivative of Vati Kalpana. Haridradi Varti is a unique herbal preparation coming under Netra Roga Chikitsa of Bhaishajya Ratnavali, contains Haridra (*Curcumin longa* Linn.), Nimba (*Azadirachta indica*), Pippali (*Piper longum* Linn.), Maricha (*Piper nigrum* Linn.), Musta (*Cyperus rotundus* Linn.), Vidanga (*Embilica ribes* Burm.F), Shunti (*Zingiber officinale* Roxb.), as ingredients and Gomutra (cow urine) as bhavana dravya.^[2] It is used in various ailments like timira, patala, nakthadhya, all types of jwara, seizure, swelling of eyes, parisrava, arbuda etc with different liquid media. As Netra Varti is said to be applied by rubbing with liquid media, there are more chances of contamination. Arka is prepared by combining Jala with the help of Agni; hence Arkas are Laghupaki, Vyavayi & Vikasi & thus assimilates quickly in the body cells.^[3]

The evolution of dosage forms includes a wide spectrum of modification from the vedic period to the modern era. With innovation of technology, people prefer cost effective and easily applicable dosage forms. Due to increased potency, reduced dose, easy absorption, faster action, and patient compliance, Arka can be considered as a better option for ophthalmic formulations than Netra Varti.

METHODOLOGY

The methodology of this work comes under 2 topics as follows

- Pharmaceutical modification of Haridradi Varti into arka in two different methods
- Analysis of organoleptic characters of both samples

MATERIALS AND METHODS**Pharmaceutical study**

In pharmaceutical study, attempt was made to convert Haridradi Varti into Arka by two different methods (with gomutra bhavita Dravya Arka & gomutra as a media (without bhavana) in Arka.

Procurement of raw material

The raw materials were procured from the department of Rasashastra and Bhaishajya Kalpana, Sri Dharmasthala

Manjunatheshwara college of Ayurveda and Hospital, Hassan.

Table 1: Ingredients of Haridradi Arka.

S. No	Ingredients	Botanical name	Parts used
1	Haridra ^[4]	<i>Curcumin longa Linn.</i>	Rhizome
2	Nimbha ^[5]	<i>Azadirachta indica</i>	Leaves
3	Pippali ^[6]	<i>Piper longum Linn.</i>	Fruit
4	Maricha ^[7]	<i>Piper nigrum Linn.</i>	Fruit
5	Musta ^[8]	<i>Cyperus rotundus Linn.</i>	Rhizome
6	Vidanga ^[9]	<i>Embelia ribes Burm.f</i>	Fruit
7	Shunti ^[10]	<i>Zingiber officinale Roxb.</i>	Rhizome

Preparation of gomutra bhavita Haridradi Arka (first method)

Arka Yantra (Distillation apparatus) was used for the preparation of Haridradi Arka. Though there is no mentioning of Haridradi arka in ayurvedic classics, as per reference of Arka Kalpna from Arka Prakasha was taken for the study.^[11]

All ingredients are taken and made fine powders and sieved separately. 15 ml(v/v) of each sieved churna were taken in a clean Khalva Yantra (mortar and pestle) and triturated with 195ml of gomutra (cows' urine). Total eight hours of bhavana was carried out until it attains subhavita lakshana and after subhavita lakshana the

drugs were dried under shade. Dried ingredients then soaked overnight in 120ml (2 parts) of water. The well soaked drug was then transferred to a distillation apparatus and 1 part(60ml) of water was added (1:3 ratio) and the mixture was continuously heated till 60% of distillate was collected.

Preparation of Haridradi Arka with gomutra as liquid media (second method)

Coarse powder of all ingredients mentioned above was taken in equal quantity of total 105ml and soaked in 2 parts of gomutra overnight. Next day remaining 1 part of gomutra was added and the mixture was shifted to arka yantra and 108ml of arka was collected.

**Figure 1: Steps of Haridradi Arka preparation.**

Analytical study

Preliminary analytical parameters mentioned for assessment of Arka Kalpana were carried out as per CCRAS Lab manual.^[12]

Morphological Evaluation: Organoleptic parameters

Physico chemical evaluation: pH, Viscosity, Specific gravity, Refractive index, Total Suspended Solids.

Organoleptic Characters: Colour, Odour, appearance.

Physico chemical parameters**pH**

pH meter was calibrated to 4,7 and 9 by using buffer solution. Buffer solution was prepared by using tablets of pH 4,9 and dissolved in 100ml of distilled water. Instrument was switched on and buffer solution was taken in a beaker and electrode was dipped in it without touching the sides of the beaker. Procedure was repeated for another buffer solution also in the same manner. After each usage the electrode was washed properly with distilled water. The test sample was taken and electrode dipped in it, the value of pH was noted.

VISCOSITY

The sample of arka under test is filled in a U tube viscometer in accordance with the expected viscosity of the liquid so that the fluid level stands within 0.2mm of the filling mark of the viscometer when the capillary is vertical and specified temperature is attained by the test liquid. The liquid is sucked or blown to specified weight of the viscometer and the time taken for the meniscus to pass the two specified marks is measured. Viscosity was measured by using the formula

$$\eta_1 = \rho_1 t_1 \times \eta_2 / \rho_2 t_2$$

η_1 – Viscosity of sample

$$\eta_1 = \rho_1 t_1 \times \eta_2 / \rho_2 t_2$$

η_1 – Viscosity of sample

$$n_1 = d_1 t_1 / d_2 t_2 \times n_2$$

n_1 - viscosity of haridradi arka

n_2 -viscosity of water

d_1 -density of haridradi arka

d_2 -density of water

t_1 - time of haridradi varti

t_2 - time of water

SPECIFIC GRAVITY

Cleaned a specific gravity bottle by shaking with acetone and then with ether. Dried the bottle and noted the weight. The sample was carefully filled the specific

gravity bottle, inserted the stopper and removed the surplus liquid. weight was noted. the same procedure was repeated with distilled water in place of sample solution. specific gravity was calculated by empty pycnometer (W1), pycnometer with distilled water(W2), pycnometer with sample(W3).

REFRACTIVE INDEX

The illumination flap of the refractometer was opened. Using a pipette or dropper sample was put on the measurement prism surface and flap was closed. The refractometer was kept in the direction of light source for easier reading. Looking through the eye piece the reading was adjusted. Then the results were noted from the scale.

TOTAL SUSPENDED SOLIDS

The refractometer was held horizontally and the day light plate was opened to expose the main prism.using pipette two drop of distilled water was placed on the prism.Then day light plate was closed lightly so that the water spreads across the entire surface of the prism and the reading was noted.In the same way sample of haridradi arka was placed on the prism and looked through the eye piece to see circular field with graduations on the either side. When the upper portion become blue and lower portion become white, noted down the results. Refractometer was opened and the main prism was pat dried.

OBSERVATIONS**First method**

Total 195ml of gomutra was required for 3 bhavana, with 125ml fed for the first and 40 ml for the 2nd and 30ml for 3rd bhavana. The duration of the bhavana was 5 hours for the first bhavana and 3 hours for the next bhavana. Trituration was done till subbhavita lakshana was attained. Drugs like musta and nimba were fibrous in nature before bhavana and after bhavana it became soft, smooth, and fine paste. During bhavana, gomutra smell was observed. It took 2 days to dry the bhavita Dravya under shade. 60 percentage of arka was collected to avoid charring and even here the smell of gomutra was prominent.

Second method

In second method, coarse powder was used for the preparation of arka. The drugs were soaked overnight and 60 percentage of arka was collected to avoid charred smell. The final product was of gomutra smell.

Results of pharmaceutical and analytical study

Table 2: Pharmaceutical results of Gomutra Bhavita Haridradi Arka (sample 1).

S. No.	Parameters	Results
1	Quantity of fine churna taken	105 ml (V/V)
2	Quantity of gomutra added for bhavana	195ml
4	Total time taken for bhavana (trituration)	8 hours
5	Total number of bhavana	3
6	Quantity of dried drugs taken for arka	60ml
6	Ratio of water added for arka	180ml
7	Temperature maintained	10 gradients
8	Volume of arka obtained	108 ml

Table 3: Pharmaceutical results of Haridradi Arka with gomutra as liquid media (sample 2).

S. No.	Parameters	Results
1	Quantity of yavakuta churna taken	60 ml (V/V)
2	Quantity of gomutra for arka	180ml
4	Temperature maintained	10 gradients
6	Volume of arka obtained	108 ml

Table 4: Organoleptic characters.

S. No.	Organoleptic characters	Gomutra Bhavita Haridradi Arka	Haridradi Arka with gomutra as media
1	Colour	Colourless	Colourless
2	Odour	Gomutra Gandha	Teekshna Gandha of gomutra
4	Appearance	Clear liquid	Clear liquid

Table 5: Results of Physico-chemical parameters of Arka.

S. No.	Parameters	Gomutra Bhavita Haridradi Arka	Haridradi Arka with gomutra as media
1	pH	7.5	8.6
2	Viscosity	0.0098	0.010
3	Specific gravity	0.99	1.00
4	TSS	0.6	2
5	Refractive index	1.31	1.34

DISCUSSION

Haridradi Varti is converted into Arka by two different methods. Arka Kalpana (Distillation) involves four steps: churneeekarana (powdering), plavana (soaking), kwathana (boiling in still) and parisruta (liquefaction). Hence it is both sterile and effective. Each step has its own scientific significance. The crushing of drugs helps in the dissociation of active principles in water. Soaking extends the period that drugs are in contact with water. Boiling facilitates the penetration of water-soluble principles into water and converts liquids to vapours. The vapours are converted to distillate by liquefaction. In first method, gomutra was used as bhavana Dravya. After bhavana, drugs incorporate the qualities and action (Guna-Karma) of gomutra along with its own. Bhavita Dravya was dried under shade. Because, hot sun rays may cause reduction in volatile principles and can even cause colour changes. Some chemicals may also be photodegraded by UV rays under sunlight, resulting in the formation of new chemicals. First few drops of distillate were discarded as it may contain fewer active principles. 60 percentage of the distillate was collected to avoid charring. Charring may affect the quality of the distillate collected.

The organoleptic characters of both samples were almost same. The parameters that can be discussed in the analytical study are specific gravity, refractive index, viscosity, and pH value. The specific gravity of a solvent indicates the presence of solutes i.e., dissolved substances. Here both the sample's specific gravity is nearly equal to one. This indicates that the solution is viscous, like water. The difference in the refractive index is caused by the consistency of the media and the solutes present in the media. The pH of the medicine affects absorption, efficacy, irritability, and other properties.

The ocular pH ranges from 6.6 to 7.8, here the pH of sample one is 7.5 which is optimum for eye drops. Total suspended solids of first sample were 0.6 and second sample was 2, as suspended particles are less in first sample than that of second sample, it may facilitate easy ocular absorption which makes it better.

CONCLUSION

Arka Kalpana is a unique formulation in ocular therapeutics. There is a wide range of possibilities in preparing herbal eye drops with the strong base of ayurvedic literature. As there are not much eye drops in ayurvedic formulations and medication in Arka form is more sterile than netra Varti. And due to increased potency, reduced dose, easy absorption, faster action, and patient compliance, Arka can be considered as a better option for ophthalmic formulations than Netra Varti. Based on the assessment of analytical parameters like pH, viscosity, specific gravity, total suspended solids, refractive index of the eye drops, among two different method, Gomutra bhavita dravya arka can be considered as most preferred option. To assess the efficacy of these arka further pre-clinical and clinical studies can be carried out.

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