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Research Article

PHARMACEUTICAL ANALYTICAL STUDY OF VIMALA VARTI: AN AYURVEDIC OPHTHALMIC PREPARATION

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ABSTRACT

Varti Kalpana, a derivative of Vati Kalpana, represents Ayurvedic suppository preparations with specific therapeutic applications. Vimala Varti, an herbal ophthalmic suppository detailed in the Sahasra Yogam under Netraroga Chikitsa, addresses various eye ailments such as Timira, Kacha, Netra Kandu, and Patala Roga. This formulation comprises eight herbal ingredients and one Bhavana Dravya. The preparation of Vimala Varti involved the Bhavana method. A comprehensive pharmaceutical study was conducted to evaluate the organoleptic and phytochemical parameters of Vimala Varti, ensuring its suitability for ophthalmic use. The final product was assessed for various parameters, including pH, hardness, friability, and loss on drying etc. pH was 6.26, hardness-5, friability 0.7.89%, loss on drying 13.6%, uniformity of weight was within the limit, total ash -3%, water soluble extractive 19.2%, acid insoluble ash 1%. These parameters can be considered the preliminary standards for Vimala Varti. This study highlights the potential of Vimala Varti as a reliable Ayurvedic treatment for eye disorders, warranting further clinical research to validate its efficacy and therapeutic benefits.

KEYWORDS: Varti Kalpana, ophthalmic preparation, pharmaceutical Analysis, ocular therapeutics.

INTRODUCTION

Panchavidha Kashaya Kalpana serves as primary Ayurvedic pharmaceutical preparations. To address issues such as short shelf life and limited palatability, secondary formulations like Varti Kalpana have been developed. Derived from Vati Kalpana, Varti preparations are intended for localized applications, targeting specific areas to alleviate Sthanika Dosha¹. They come in various types such as Yoni Varti, Sishna Varti, Guda Varti, and Netra Varti, each designed for specific sites of application and action. Vimala Varti, an herbal ophthalmic suppository detailed in the Sahasra Yogam under Netraroga Chikitsa, addresses various eye ailments such as Timira, Kacha, Netra Kandu, and Patala Roga². There is another reference for Vimala Varti in Ashtanga Hridaya Uttarasthanam that lists different ingredients in varying proportions, yet it is used for the same indication³.

Acharya have explained different kinds of Netra Varti /Anjana application in varieties of ophthalmic disorders. According to Charaka Acharya, the eyes are predominantly governed by Tejas, making them susceptible to Kapha dosha. Anjana application helps alleviate Kapha dosha and promotes clarity of vision.⁴

Varti Kalpana got its name because of its shape i.e., like the wick of a lamp. The preparation is almost like Vati preparation. Varti are made by grinding the fine powders of the drugs with the liquid mentioned in the formulation to form a soft paste. This paste is then moulded into thin sticks approximately about 2 cm in length and dried in the shade. Two general methods are commonly used for preparing Varti: the Paka method and the Bhavana method.⁵

In the Paka method, Guda or Sharkara is taken in the required quantity along with sufficient water and boiled over mild heat. Once the mixture reaches a two-thread consistency, the vessel is removed from the heat, and fine powder of medicinal drugs is gradually added while stirring continuously to achieve a homogeneous mixture. When the mixture exhibits the characteristics of Guda Paka Siddha Lakshana and attains the appropriate consistency for preparing Varti, Varti of the desired size can be shaped. These are then dried in the shade and stored in airtight containers at suitable room temperature.

In the Bhavana method, the medicinal drugs mentioned are individually pounded and sieved to obtain fine powder. These powders are then mixed and triturated together with the liquid mentioned in the preparation. Once the mixture reaches Subhavita Lakshana, indicating the appropriate consistency for shaping Varti, Varti of the desired size are prepared. These are subsequently dried in the shade and stored in airtight containers at suitable room temperature. For the preparation of Vimala Varti, the bhavana method is chosen among the general methods of Varti preparation.

As there is no research work carried out regarding the pharmaceutical standardization of this compound formulation, the specific reference of Vimala Varti has been taken up for study.

MATERIALS AND METHODS

Pharmaceutical study

Vimala Varti was prepared according to the reference from Sahasra Yogam. Table 1 illustrates the ratio of ingredients used in

the preparation. The raw materials were procured and authenticated from the teaching pharmacy of Rasa Shastra and Bhaishajya Kalpana, Sri Dharmasthala Manjunatheshwara

College of Ayurveda and Hospital, Hassan. Pharmaceutical and physicochemical analysis were conducted in the QC Lab.

Table 1: Ingredients and their Proportions

S. No	Ingredients	Botanical Name	Parts Used	Quantity
1	Yashtimadhu	<i>Glycyrrhiza glabra</i> L.	Root	1 part (5 gm)
2	Maricha	<i>Piper nigrum</i> Linn	Fruit	1 part (5 gm)
3	Pippali	<i>Piper longum</i> Linn	Fruit	1 part (5 gm)
4	Lodhra	<i>Symplocos racemosa</i> Roxb.	Stem bark	1 part (5 gm)
5	Daruharidra	<i>Berberis aristata</i> Dc	Stem	1 part (5 gm)
6	Haritaki	<i>Terminalia chebula</i> Retz.	Fruit	1 part (5 gm)
7	Vibhitaki	<i>Terminalia bellerica</i> Roxb.	Fruit	1 part (5 gm)
8	Amlaki	<i>Emblica officinalis</i> Gaertn.	Fruit	1 part (5 gm)
9	Himambu (Rose water)	-	-	Q. S

Method of preparation of Vimala Varti

Preparation of Sukshma Churna - Herbal ingredients like Yashtimadhu, Maricha, Pippali, Lodhra, Daruharidra, Haritaki, Vibhitaki, Amlaki were weighed equal & pounded separately and sieved through a No. 85 mesh to obtain a fine powder.

All fine powders of the above mentioned herbal ingredients were placed in a clean Khalva Yantra (mortar and pestle) and triturated

with 75 ml of Himambu for the first Bhavana. The first Bhavana was conducted for 4 hours and then subjected to drying. This process was repeated two more times with 7 ml of cold water each time to complete the procedure. The total duration taken for Bhavana to attain the Siddhi Lakshana was 8 hours. After completing the levigation (Bhavana), conical-shaped suppositories of uniform size and shape were prepared and left to dry under shade for 3-4 days.



Figure 1: Ingredients of Vimaladi Varti



Figure 2: Steps of Vimaladi Varti preparation

ANALYTICAL STUDY

The analytical study of Vimala Varti was conducted following the protocol outlined in the guidelines for testing Ayurvedic medicines, as published by CCRAS.⁶

Morphological Evaluation: Organoleptic parameters
Physico chemical evaluation: pH, Hardness, Friability, Uniformity of weight, Loss on drying, Total ash, Water soluble extractive, Acid insoluble ash.

Organoleptic Charecters: Colour, Odour, Appearance of the Varti was analysed.

Phytochemical parameters: Phytochemical analysis of Vimala Varti was conducted using aqueous extracts to identify the various constituents present.

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 (for solid dosage form 10% aqueous solution) was taken and electrode dipped in it, the value of pH was noted.

Hardness: The varti was held between a fixed and a moving jaw and reading of the indicator adjusted to zero. The force adjusted to the edge of the varti was gradually increased by moving the source knob towards until the tablet breaks. The reading was noted from the scale which indicates the pressure required in kg on the tablet to break the tablet.

Friability: Ten Vimala varti were correctly weighed after being dusted. Varti then placed in the drum of friabilator and rotated for 100 times. Varti were taken out after rotation then dusted and precisely weighed. The difference in weight was measured, which indicate friability.

Uniformity of weight: Randomly selected 20 varti and weighed accurately. Calculated the average weight of varti by adding weight of individual varti by total number of varti.

Loss on drying: In a tarred evaporating dish, 10g of drug were weighed. The weighed medicine was placed in a hot air oven, dried at 105°C for five hours and weighed once more. The evaporating dish was once again dried in the oven for 30 minutes, until the difference between the two weights corresponded to not more than 0.25%. After drying for 30 minutes and cooling in a desiccator, procedure continued until constant weight was attained.

Water soluble extractive: Five grams of the sample was weighed in a glass stoppered flask. To this 100ml of distilled water was added, shaken occasionally for 6 hours. It was allowed to stand for 18 hours. It was filtered rapidly taking care not to lose any solvent. 25 ml of the filtrate was pipetted out in a pre-weighed 100 ml beaker. It was evaporated to dryness on a water bath. It was kept in a hot air oven at 105 for 6 hours. It was cooled in desiccators and weighed. Repeat the experiment twice. Take the average value.

Total ash: 1gm fine powder of Vimala Varti is taken and put it in the crucible with the help of spatula. Weight of the crucible was measured along with the drug and then placed it inside the electric muffle furnace at not exceeding 450°C for 5 hours. After 5 hours the crucible was taken out with tongs and kept in the desiccator for 10 min. Weight of the crucible with ash was checked again and calculated the percentage of ash.

Acid insoluble ash: Total ash was divided into 2 equal parts, one part was taken in 250ml beaker, and 100ml of dilute hydrochloric acid was added to it. The beaker was heated till the liquid boils. The solution was filtered through ash less filter paper (what man no.41), the insoluble matter on the ash less filter paper was taken in a crucible. The crucible is dried in a hot plate and ignited at 450 °C in a muffle furnace for 5 hours (till it becomes white), then

crucible is kept in a desiccator for 30 minutes, and weighed without delay. The process was repeated for one more time, to obtain a constant weight. Calculated the percentage of acid insoluble ash with respect to the weight of sample taken.

Phytochemical parameters

1. Test for alkaloid

Mayer's test: A few drops of Mayer's reagent were added to 2-3 ml of filtrate. Cream (dull white) precipitate indicates the presence of alkaloids.

Dragandroff's test: A few drops of Dragandroff's reagent were added to 2-3 ml of filtrate. Orange red precipitate indicates the presence of alkaloids.

Wagner's test: A few drops of Wagner's reagent were added to 2-3 ml of filtrate. Reddish brown precipitate indicates the presence of alkaloids.

2. Test for steroids

Salkowski reaction: A small quantity of the filtrate was mixed with 2 ml Chloroform and 2 ml concentrated Sulphuric acid. Shake it well. Chloroform layer appears red and acid layer shows greenish yellow fluorescence.

3. Test for Carbohydrates

Benedict's test: Few ml of filtrate was mixed with equal volume of Benedict's reagent and heated in boiling water bath for 5 minutes. Formation of reddish-brown precipitate infers the presence of reducing sugars.

Fehling's test: 1 ml Fehling's-A was added to 1 ml of Fehling's-B solution, boiled for one minute. To this added 1 ml of filtrate and heated gently. Formation of brick red precipitate indicates the presence of reducing sugars.

4. Test for proteins:

Biuret test: 3 ml of test solution was added to 4% Sodium hydroxide and few drops of 1% Copper sulphate solution. Formation of violet colour indicates the presence of proteins.

5. Test for glycosides

Bortranger's test: The test sample is boiled with dilute sulfuric acid, then filtered and cooled. The filtrate is extracted with chloroform or benzene, and dilute ammonia is added to it. The ammoniacal layer turns pink to red due to the presence of anthraquinone derivatives.

6. Test for Flavonoids

Sulphuric acid test: On addition of Sulphuric acid (66% or 80%) flavones and flavanols dissolve into it and give a deep yellow solution. Chalcones and auronones give red or red bluish solutions. Flavanones give orange to red colours.

7. Test for Tannins

Lead acetate test: A 10 percent w/v solution of basic lead acetate in distilled water was added to the test filtrate. Development of precipitate indicate the presence of tannins.

Bromine water test: Bromine solution was added to the test filtrate. Decolorization of bromine water indicated the presence of tannins.

8. Test for Saponin:

Foam test: A small quantity of the extract was diluted with 20 ml of distilled water and shaken it in a graduated cylinder for 3 minutes. Foam of 1cm after 10 minutes indicates the presence of saponins.

OBSERVATIONS & RESULTS

During the preparation process characteristic odour of the ingredients was observed while powdering the ingredients in Khalva yantra. During the three rounds of Bhavana, a total of 89ml of Himambu (Rose water) was utilized, with 75ml utilized for the initial Bhavana and 14ml for subsequent Bhavana. The first Bhavana lasted for 4 hours, while the following two Bhavana lasted 2 hours each. Initially, ingredients like Yashtimadhu, Lodhra, and Daruharidra were hard, rough, and fibrous. However, after each Bhavana, they transformed into a soft, smooth, and fine paste. Despite the fibrous nature of some herbal ingredients, further particle reduction was challenging during Bhavana. Trituration continued until Subhavitā Lakshana was observed, accompanied by a pleasant aroma from the ingredients. Post-levigation, the paste weighed 76.64gm, which was then shaped into Varti of uniform size (2gm) and Yavakriti (barley-like shape). Following thorough drying, each Varti weighed approximately 1gm.

Results of pharmaceutical and analytical study

Table 2: Pharmaceutical results of Vimala Varti

Parameters	Results
Quantity of fine Churna taken	40gm
Quantity of water added	89 ml
Total time taken for Bhavana (trituration)	8 hours
Number of Varti obtained	34
Average weight of Varti before drying	2gm
Average Weight of Varti after drying	0.99gm

Table 3: Organoleptic characters

Organoleptic characters	Vimala Varti
Colour	Brown
Odour	Specific to ingredients
Consistency	Fine
Taste	-

Table 4: Results of Physico-chemical parameters of Vimala Varti

Parameters	Results
pH	6.26
Hardness	5
Friability	07.89%
Average weight	0.99gm
Uniformity of weight	Within limit
Loss on drying	13.6%
Total ash	3%
Water soluble extractive	19.2%
Acid insoluble ash	1%

Table 5: Phytochemical analysis of Vimala Varti

Phytochemical constituents	Test done for identification	Results
Alkaloids	Mayer's test	-
	Wagner's test	
	Dragendorff's test	
Steroids	Salkowaski test	+
Carbohydrates	Benedict's test	+
	Felhing's test	
Proteins	Biuret test	+
Glycosides	Borntranger's test	+
Flavonoids	Sulphuric acid test	-
Tannins	Lead acetate test	+
Saponins	Foam test	+

DISCUSSION

There are many formulations mentioned in Ayurvedic classics for the treatment of eye disorders, and Vimala Varti is one such preparation mentioned in Sahasrayogam under Netraroga Chikitsa. The ingredients include Yashtimadhu, Maricha, Pippali, Lodhra, Daruharidra, Haritaki, Amlaki, and Vibhitaki in equal ratios. In the pharmaceutical study, all the ingredients were powdered and sieved through a No. 85 mesh to obtain a fine powder. Some loss in the percentage of the drug during powdering was observed, possibly due to the hard and fibrous nature of drugs like Daruharidra, Yashtimadhu, and Lodhra.

The purpose of Bhavana is to reduce particle size, minimize untoward effects, and increase the bioavailability of the drugs. An 8-hour Bhavana was performed to enhance absorption, reduce irritation, and ensure consistent efficacy. Bhavana was done with Himambu (rose water), which has a natural cooling effect beneficial for eye preparations, as it soothes and calms inflamed or irritated ocular tissues. The triturated mixture was dried under shade for 3-4 days to preserve the active components, prevent degradation from direct sunlight, and ensure a stable final product. The weight of the Varti after drying decreased by 49.5% due to the loss of moisture content.

Triphala that is Amlaki, Haritaki, Vibhitaki is having adaptogenic, antioxidant, anti-cataract, immunomodulatory, antidiabetic actions. Triphala antioxidant effects may help maintain eye health.⁷ Acharya Sharangadhara stated that Triphala is a drug of choice for all types of Netra Abhishyanda⁸. Yashtimadhu owns properties like Madhura rasa, Snigdha Guna, Seetha Veerya, and Chakshushya helps in treating eye disorders. Most of the content in the Vimala Varti contains Tikta and Katu rasa. It possesses Lekhana and Chakshushya properties. It is best for cleaning the eyes. Yashtimadhu and Daruharidra contribute to the comprehensive care of dry eye syndrome by restoring tear film functions, preventing ulceration, and suppressing the inflammatory process⁹.

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 6.26 which is optimum for eye drops. Varti needs a minimum amount of strength to withstand the mechanical shock of handling during manufacture, packaging, and transport. The hardness of Vimala Varti was 5 kg, indicating its strong nature, making it difficult to break easily when rubbed with a liquid medium while application. The loss on drying of Vimala Varti was 13.6%, reflecting the moisture level present in the Varti. Maintaining appropriate moisture content is vital for ensuring the stability and prolonging the shelf-life of the product. As the specific weight is not mentioned for Vimala Varti, it was prepared in 1g size and 2cm in length, as mentioned in AFI¹⁰.

The phytochemical test was done on water soluble extract of Vimala Varti. The test revealed the presence of carbohydrates, proteins, glycosides, saponins, and steroids. The combination of these compounds can address multiple aspects of eye disorders, including infection control, inflammation reduction, moisture retention, and tissue repair.

CONCLUSION

Vimala Varti is an herbal ophthalmic suppository mentioned in Sahasra Yogam, Netraroga Chikitsa. It is used in various ailments like Timira, Kacha, Netra Kandu, Patala Roga. It consists of 8 ingredients and 1 Bhavana Dravya. Among the general method of preparation of Varti, Bhavana method is opted for Vimala Varti. Pharmaceutical and analytical study serves the preliminary

information about the Vimala Varti. To assess the efficacy further pre-clinical and clinical studies can be carried out.

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