



Pharmacognostical and physicochemical analysis of pathyadi varti – A polyherbal ayurvedic formulation

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Abstract

Many of the herbal formulations indicated for internal use in various ailments, are very useful in eye diseases also. Classics have also described some formulations as local application in the form of *vartis* (Pills), *anjana* (Collyrium), and eye drops etc. These are very effective but most of them still to be standardized as far as their quality, S.O.P., properties and characteristics. In the present study a systematic approach has been evolved and effort has been made to develop well designed methodology for the standardization of *Pathyadi varti* - an Ayurvedic formulation for local application. The finished product was subjected to organoleptic, microscopic characterization, physico-chemical screening, phyto-chemical analysis and HPTLC studies. The pharmacognostical evaluation shows fragments of mesocarp cells, sclereids, tannin contents of *Haritaki*; pitted vessels, lignified fibres, and larger starch grains of *Yashtimadhu*; beaker shaped stone cells and oil globules from *Maricha*. The absence of prismatic crystals was significant outcome. The Phytochemical analysis shows the presence of alkaloids, tannins, flavonoids, saponins and anthraquinon glycosides. Spots obtained in HPTLC were found resembling spots of glycyrrhizin at R_f 0.27 and piperine at R_f 0.60 as reported in previous studies.

Key-Words: *Pathyadi varti*, Pharmacognosy, Physicochemical, HPTLC

Introduction

Indian traditional systems of medicine mainly comprises of Ayurveda, Siddha and Unani. Ayurveda is the oldest holistic management system with meticulously documented medicines and being practiced by a large population in India and abroad.ⁱ The development of this traditional system of medicines with perspectives of safety, efficacy and quality will help not only to preserve the traditional heritage but also to rationalize the use of natural products in health care.^{ii,iii} Majority of the remedies are based on plants and plants products along with minerals as well as animals origin. These medicine systems also described some formulations as local application in the form of *vartis*, *anjana*, eye drops etc. These generally improve the resistance, immunity, strengthen the organ or system and alleviate the ailments.

The subject of herbal drug standardization is massively wide and deep. There is so much to know and several seemingly contradictory theories on the subject of herbal medicines and their relationship with human physiology as well as mental function. India can emerge as the major country and play the lead role in production of standardized, therapeutically effective Ayurvedic formulations. This can be achieved only if the herbal products are evaluated and analyzed using sophisticated modern techniques of standardization. As per the estimates of World Health Organization (WHO), more than 80% of global population uses plants or their products as the primary source of medicinal agents.² The WHO has appreciated the importance of medicinal plants for public health care in developing nations and has evolved guidelines to support the member states in their efforts to formulate national policies on traditional medicines and to study their potential usefulness including evaluation, safety and efficacy.^{iv}

Pathyadi varti, an Ayurvedic polyherbal formulation consists of *haritaki*, *yashtimadhu*, *marich* and *tuttha*, and is indicated for almost all kind of the eye disorders including cataract.⁵ The report on the standardization of *Pathyadi varti*, in present study is based on organoleptic, microscopic, physico-chemical, phyto-chemical parameters and HPTLC study.

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Material and Methods

Collection/Procurement of the drug

Ingredients viz. fruits of *Haritaki* (*Terminalia chebula* Retz), roots and stolon of *Yashtimadhu* (*Glycyrrhiza glabra* Linn), fruits of *Maricha* (*Piper nigrum* Linn.) were procured from the local market of Kerala, India. Raw *Tuttha* (CuSO_4) was obtained from the pharmacy, and *varti* was prepared (Table: 1) in the Dept of RS & BK, I.P.G.T. & R.A., Jamnagar, India. Their identities were confirmed by correlating their morphological and microscopical characters with those given in the literature.

Preparation of test drug

The obtained fruits and roots-stolons were shade dried and made in to fine powder separately with the help of mechanical grinder, sieved through 85# and stored in airtight containers. Raw *tuttha* was dissolved in sufficient quantity of distilled water, filtered once and dried until clear crystals were obtained. Again these crystals were dipped in half amount of lime juice and triturated till gets dried, which requires at least 6 hrs trituration. After this all the above powders were mixed and pounded well with sufficient quantity of cold water and the *vartis* were prepared of homogenous size as per description in Ayurvedic classics.^v

Organoleptic Evaluation

Various parameters such as colour, odour, taste, touch and texture of the finished product (*varti*) were observed and recorded.⁵

Microscopic Evaluation

Sample drug was powdered, dissolved in a small amount of distilled water for a while and then mounted in glycerin. Microscopical examination was carried out with and without staining.^{vi} By powder microscopy, to observe the characters, determine the chemical nature of the cell wall along with the determination of the form and chemical nature of the cell contents. Microphotographs were taken by using Carl Zeiss binocular microscope attached with camera.^{vii}

Physico-chemical Constants

In physical evaluation hardness, weight variation, foreign matter, moisture content, ash values viz., total ash, acid insoluble ash and extractive values viz., alcohol soluble extractive value, water soluble extractive value as well as pH value etc. were determined.^{viii}

Phyto-chemical Analysis

Preliminary tests were carried out on methanolic extract for the presence or absence of phytoconstituents like alkaloids, tannins & phenolic compounds, flavonoids, saponins and anthraquinon glycosides.^{ix,x}

High Performance Thin Layer Chromatography (HPTLC)

HPTLC was performed as per the guidelines provided by API.^{xi} Methanolic extract of drug sample was used for spotting. HPTLC was performed using Toluene + Ethyl acetate + acetic acid (7:2:1) solvent system and observed under visible light after derivatisation with vanilline sulfuric acid followed by heating the plate at 110°C. The colour and R_f values of the resolved spots were noted. (Table: 5)

Results and Discussion

Organoleptic Characters

Vartis characterized as hard in texture, smooth in touch, blackish green in colour, characteristic of citric in odour and pungent in taste. (Table: 2)

Microscopical Characters

Diagnostic characters of microscopic analysis of test drug shows the presence of mesocarp cells, tannin contents, spherical pitted stone cells, elongated pitted sclereids and starch grains smaller in size indicated the presence of *Terminalia chebula*. Fragments of mesocarp cells, beaker shaped stone cells, stone cells intercepted with parenchyma cells and fraction of volatile oils indicated the presence of *Piper nigrum*; fragments of epidermal cells, pitted vesicles, simple fibers, lignified fibers, yellowish coloured tannin content, and larger sized starch grains with concentric hilum indicate the presence of *Glycyrrhiza glabra* Linn. (Photo Plate: 1)

Point of interest

Absence of any kind of crystals viz; prismatic crystals of calcium oxalate. These are specific characters of the ingredient *yashtimadhu*. It is due to the continuous grinding along with *Nimbu swarasa shodhita tuttha*, acidic in nature, able to dissolve the all crystals. This indicates that the standard procedures were carried out during drug preparation.

Physico-chemical Parameters

Physio-chemical parameters of *Pathyadi varti* are tabulated in Table: 3. Loss on drying at 110°C is one of the major factors responsible for the deterioration of the drugs and formulations. Low moisture content is always desirable for higher stability of drugs. The results of loss on drying at 110°C of prepared *vartis* showed the lower limits than the prescribed in API. A high ash value is indicative of contamination, substitution, adulteration or carelessness in preparing the formulation. The results of ash value revealed that the preparation have lower value than mentioned in API. Water soluble and alcohol soluble extractive value plays an important role in evaluation of crude drugs. Less extractive value indicates addition of exhausted material, adulteration or incorrect processing

during drying or storage or formulating. The extractive values of preparation were observed equal in both water as well as alcohol.

Phyto-chemical analysis

Preliminary qualitative analysis showed the presence of alkaloids, tannin & phenolic compounds, flavonoid, saponin glycosides, anthraquinone glycosides indicating the active compounds were not disturbed during the preparation. (Table: 4)

High Performance Thin Layer Chromatography

The HPTLC profiles of methanolic extract of the formulation are super - imposable indicating the presence of all the constituents as per the ingredients. Some of the spots at R_f 0.05, 0.13, 0.30, 0.49 and 0.60 were observed in both the short UV light and long UV light spectrum. The spot at 0.27 was recognized as presence of glycyrrhizin^{xii} in short UV and 0.60 as presence of piperine^{xiii} in both the short UV light and long UV light spectrum as reported in various studies (Table: 5). HPTLC of the test drug after derivatisation with vaniline sulphuric acid reagent showed four major spots. (Photo plate: 3)

After analysis of *Pathyadi varti* by different parameters such as foreign matter, moisture content, total ash, acid insoluble ash, water and alcohol soluble extractives and HPTLC densitograms shows good co-relation between them and are similar as per the previous reported works. The study of microscopic characters of present formulation shows the presence of diagnostic identifying characters of ingredients which are used. The absence of prismatic crystals was significant outcome. So it can be concluded that these parameters can be used for the evaluation of *Pathyadi varti*. Purity and potency of the materials and formulations following the procedures given could be performed in QC/QA laboratory of pharmaceutical house. The present study can serve as the reference for the future works on *Pathyadi varti*.

Acknowledgement

The authors are thankful to the authorities of IPGT&RA, and Gujarat Ayurved University for providing facilities to carry out the research work.

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Table 1: Ingredients of *Pathyadi varti*

Name of Ingredients	Parts used	Ratio
<i>Haritaki</i>	Fruits	1 part
<i>Tuttha (Nimbu swaras shodhita)</i>	Powder	1 part
<i>Yashtimadhu</i>	Roots & stolons	1 part
<i>Maricha</i>	Fruits	16 part

Table 2: Organoleptic characters of *Pathyadi varti*

Parameters	Results
Colour	Blackish green
Odour :	characteristic-citric
Taste	Pungent
Touch	Smooth
Texture	Hard

Table 3: Physicochemical constants of *Pathyadi varti*

Parameters	Results
Foreign matter	Nil
Loss on Drying	8.58 %
Total Ash content	6.45 % w/w
Acid insoluble ash	0.29 % w/w
Alcohol soluble extractive value	12.40 % w/w
Water soluble extractive value	12.40 % w/w
pH Value	4.0

Table 4: Phytochemical analysis of *Pathyadi varti*

Components	Results
Alkaloids	+
Tannin & Phenolic compounds	+
Flavonoid	+
Saponin Glycosides	+
Anthrquinon glycosides	+

+ Present

Table 5: HPTLC study of *Pathyadi varti*

No of spots	Rf values of methanolic extract of <i>Pathyadi varti</i>	
	254 nm	366 nm
1	0.05	0.05
2	0.13	0.13
3	0.27	0.30
4	0.30	0.49
5	0.49	0.53
6	0.60	0.60
7	0.68	0.76
8	0.80	0.97
9	0.93	

Photo Plate 1: Powder Microscopy of *Pathyadi varti*

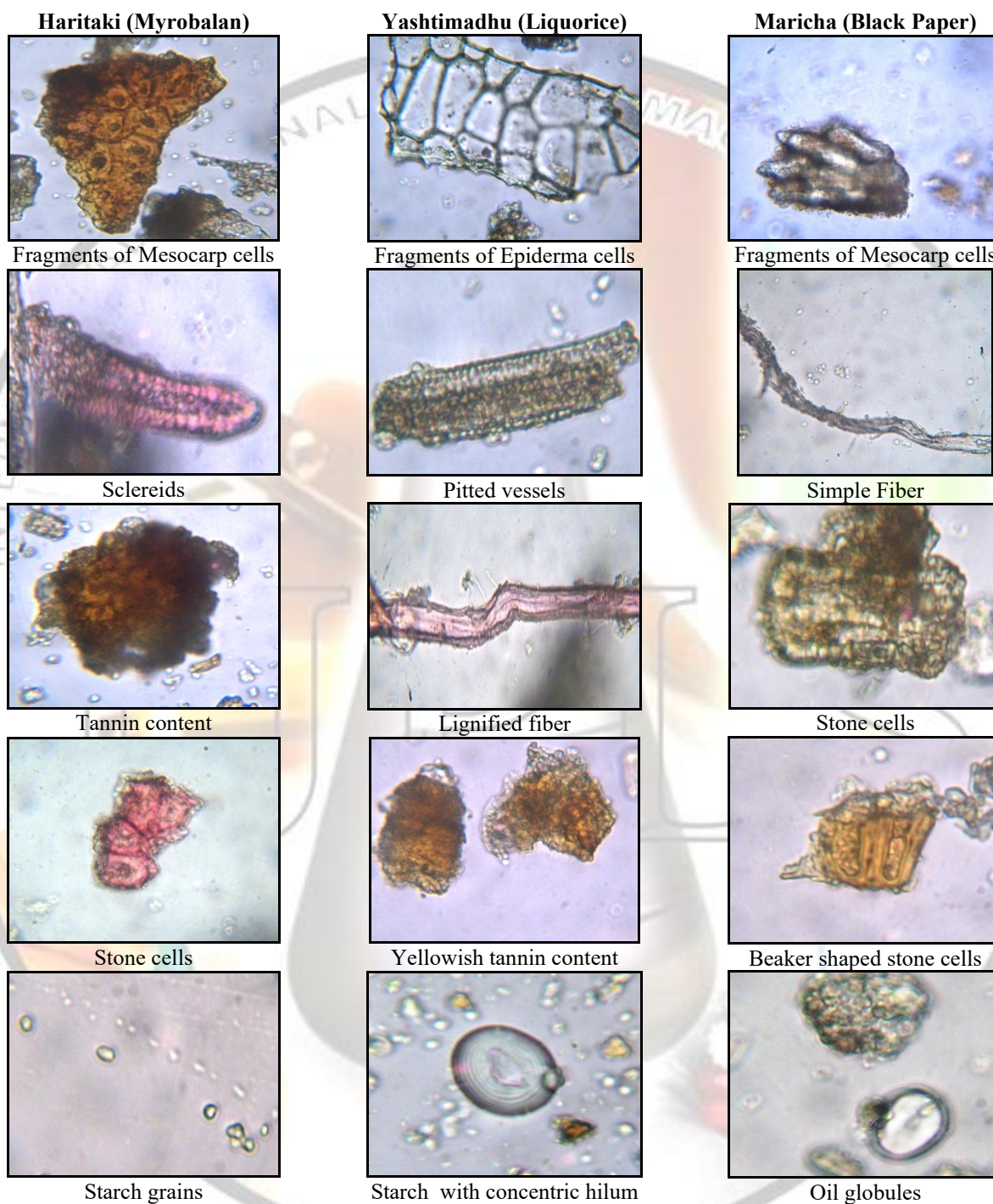


Photo Plate 2: Densitograms of Methanolic extract of *Pathyadi varti*

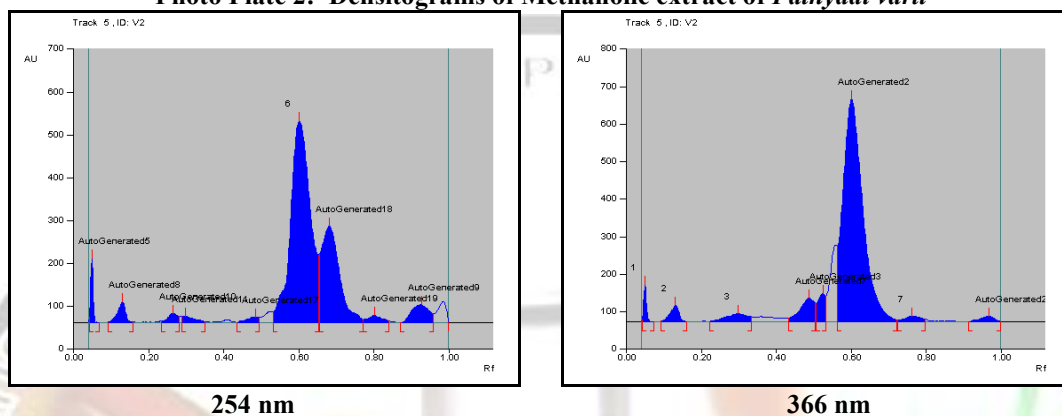


Photo Plate 3: HPTLC Plates of Methanolic extract of *Pathyadi varti*

