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PHARMACOGNOSTIC AND PHARMACEUTICAL PROFILE OF *TRIPHALADI GHANA VATI*: AN *AYURVEDIC* APPROACH TO MANAGING *YAUVANPIDIKA*

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ABSTRACT

Background: *Triphaladi Ghana Vati* is a made up of 9 ingredients i.e. *Triphala, manjistha, Nimba, Patola, Haridra, Vacha, Katuki*. Which is mentioned in *Charaka Samhita* under *Kushtha Chikitsa.* Here, this medicine is used for acne management, yet no studies have been conducted specifically on *Triphaldi Ghana Vati* for the treatment of Acne Vulgaris. Therefore, to ensure the quality of this herbal formulation, pharmacognostical and pharmaceutical analyses were performed. **Methods**: *Triphladi Ghana Vati* was subjected to microscopic evaluation for pharmacognostical identification and various physiochemical tests, including loss on drying, water and acid-insoluble extracts, hardness of the Vati, pH value, and thin layer chromatography (TLC). **Results**: The pharmacognostical study revealed characteristic features of the ingredients used in *Triphaldi Ghana Vati*. The physiochemical analysis showed the following results: loss on drying 14.278% w/w, Ash value 8.17% w/w, water-insoluble extract 53.4%, acid-insoluble extract 59.7%, *Vati* hardness 3.8, and pH value 6.5. TLC analysis identified four spots at 254 nm and two spots at 366 nm. **Conclusions:** The pharmacognostical and physicochemical studies of *Triphaladi Ghana Vati* conform to standard parameters, providing a foundation for further research on the therapeutic efficacy of this *Vati* formulation.

INTRODUCTION

As the *Yauvanpidika* is occurring due to vitiation of *Kapha, Vata, Rakta*[1] and as the name suggests manifesting in the age of *Pitta Kala*[2] *(Yuva Avstha*) and other psychological cause, so treatment needs multi-dimensional approach for the management. So, the drugs should have properties which can balance all three *Dosha*, purify the *Rakta Dhatu* and having *Medhya* properties. So, in this comparative study an attempt is being made to evaluate that whether *Triphaladi Ghana Vati*[3] is effective in management of *Yauvanpidika.*

When utilizing herbal medicines for internal use, it is paramount that they are safe, effective, free from adulteration, and contain the appropriate quantities and quality of active ingredients. The task of accurately identifying herbal drugs, especially in dry or powdered forms, poses significant challenges, underscoring the necessity for standardized quality control parameters. Pharmacognostical investigations play a crucial role in plant identification and in the establishment of these standards, which are essential for the proper standardization of traditional herbal remedies. Physiochemical analyses, such as High-Performance Liquid Chromatography (HPLC) and Thin Layer Chromatography (TLC), offer profound insights into the pharmacokinetics and pharmacodynamics of these substances, facilitating the identification of active constituents and the detection of potential adulterants.

In the domain of *Ayurveda*, the implementation of rigorous quality control measures for both raw materials and finished products, utilizing contemporary scientific methods, has become progressively essential. This approach not only bolsters the credibility of *Ayurvedic* formulations but also aids in their widespread global acceptance. Consequently, the present study was undertaken to assess the authenticity of *Triphaladi Ghana Vati* through a series of pharmacognostical procedures, as well as to establish its comprehensive pharmacognostical and phytochemical profile.

METHOD

Collection, Identification and Authentication of raw drugs

All the raw materials necessary for the formulation of drug were obtained from the pharmacy of I.T.R.A. Jamnagar. *Arjuna, Patola, Shankhpushpi & Mandukparni* were acquired from external sources.

Then the raw drugs were identified and authenticated in the pharmacognosy laboratory of Institute for Teaching and Research in Ayurveda, Jamnagar. The ingredients and part used of the *Triphaladi Ghana Vati* are given in Table 1.

Table no. 1: Details of drug.

Drug	Latin name	Family	Part used	Proportion
Amalaki	*Emblica officinalis* Gaertn.	Euphorbiaceae	Fruit	1 Part
Vibhitaki	*Terminalia bellirica* Roxb.	Combretaceae	Fruit	1 Part
Haritaki	*Terminalia chebula Retz.*	Combretaceae	Fruit	1 Part
Nimba	*Azadirachta indica A.* Juss.	Meliaceae	Stem bark	1 part
Patola	*Trichosanthes cucumerina* L.	Cucurbitaceae	Whole plant	1 part
Manjistha	*Rubia cordifolia* Linn.	Rubiaceae	Stem	1 part
Kutaki	*Picrorhiza kurrora* Royle	Scrophulariaceae	Root	1/2 part
Vacha	*Acorus calamus* Linn.	Acoraceae	Rhizome	1/2 Part
Haridra	*Curcuma longa* Linn.	Zingiberaceae	Rhizome	1 Part

Preparation of drug

- The drug was prepared at the pharmacy of I.T.R.A., Jamnagar, adhering to the standard method for Vati preparation. Once prepared, the drug was stored under aseptic conditions and maintained in a hygienic environment.
- In *Thriphaldi Ghana Vati*, all the ingredients were taken in equal parts except *Katuki* and *Vacha* is in half quantity. *Kwath* was made from these ingredients and evaporated till it takes *Ghana*(dense) form and then *Vati* of 500mg was made.

Pharmacognistical study

The pharmacognostical study was divided in to organoleptic study and microscopic study of the finished product.

Organoleptic study

The authenticity of the herbal formulation can be determined through the organoleptic characteristics of the sample. Organoleptic parameters, including color, odor, taste, and texture, of *Triphaladi Ghana Vati* were scientifically analyzed following standard references.[4]

Microscopic study

Triphaladi Ghana Vati was dissolved in water, and microscopy of the sample was performed both without staining and after staining with phloroglucinol and hydrochloric acid (HCl).

Microphotographs of the finished product were captured using a Carl Zeiss trinocular microscope.

With the help of various standard physico-chemical parameters, *Triphaladi Ghana Vati* was analysed. The common parameters mentioned for *Vati Kalpana* in Ayurvedic Pharmacopeia of India, and CCRAS, guidelines are loss on drying, water-soluble extract, alcohol soluble extract, Ash value, pH and hardening of the *Vati*.[5]

High Performance Thin Layer Chromatography (HPTLC)

High Performance Thin Layer Chromatography (HPTLC) is an advanced analytical technique employed for the separation, identification, and quantitative analysis of a broad range of compounds, even within complex mixtures. It is especially effective for identifying active constituents, detecting impurities, and quantifying active ingredients. The principle of HPTLC is based on adsorption, similar to traditional Thin Layer Chromatography (TLC). In this method, samples are applied as spots onto a thin layer of adsorbent material coated on a chromatographic plate. The mobile phase solvent moves through the stationary phase via capillary action, overcoming gravitational forces. Components with a higher affinity for the stationary phase move more slowly, while those with a lower affinity travel faster, leading to the separation of the components based on their differing affinities for the stationary phase.[6]

RESULT

The main objective of the study was to validate the authenticity of the drugs used in the preparation of *Triphaladi Ghana Vati.* To accomplish this, the coarse powder of the ingredients was subjected to organoleptic and microscopic evaluations to confirm the authenticity of the raw materials. Following the preparation of the formulation, pharmacognostical evaluation was carried out. The organoleptic evaluation involved documenting the color, odor, and taste of the ingredients, with the details provided in Table 2.

Table no. 2: Organoleptic characters of *Triphaldi Ghana Vati.*

	Parameter	Results
1	Color	Brownish black
2	Odor	Characteristic
3	Taste	Bitter
4	Touch	Hard

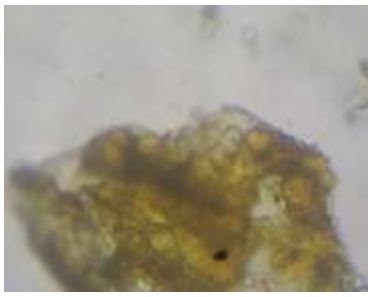
Microscopic evaluation

Diagnostic characters were observed under the microscope were fiber of *Amalaki*, scleroid of

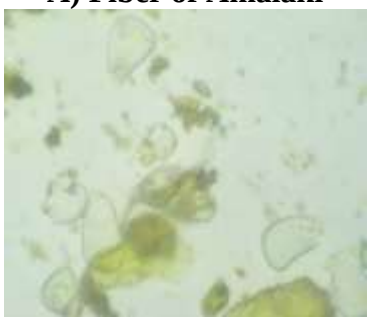
Haritaki, tannin cantant of *Haritaki*, bibi- pitted stone of *Bibhitaki*, bibi trichome *Bibhitaki*, cork of *Nimba*, crystal fiber of *Nimba*, septate fiber of *Patola etc.*

A) Fiber of Amalaki

B) Scleroid of Haritaki

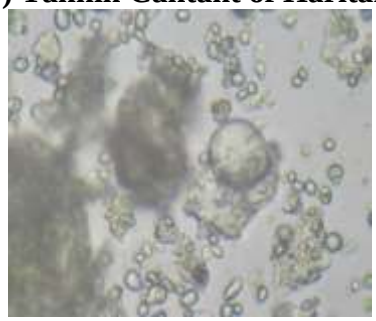


C) Tannin Cantant of Haritaki



D) Bibi- Pitted Stone of Bibhitaki

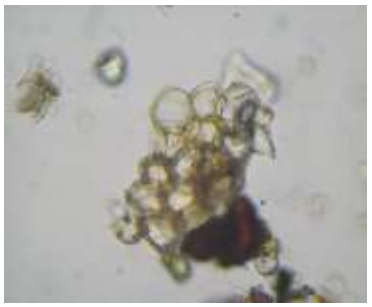
E) Bibi Trichome Bibhitaki



F) Cork of Nimba

G) Crystal Fiber of Nimba

H) Septate Fiber of Patola



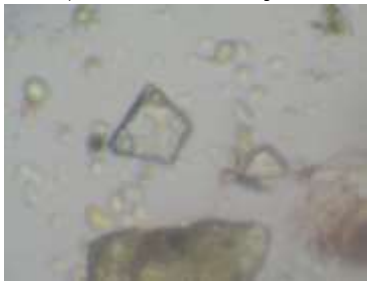
I)Trichome of Patola

J) Crystal of Manjistha

K) Prismatic Crystal

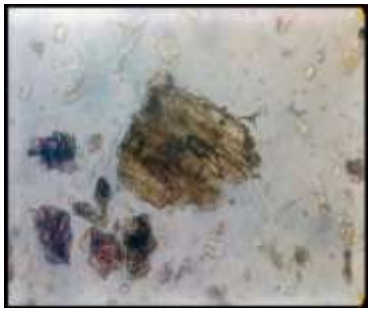
L) Simple Fiber of Haridra

M) starch grains of Haridra,

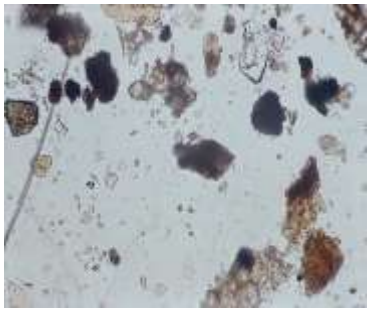


N) vessels of Haridra

O) annular vessel of Vacha



P) starch grains of Vacha



Q) fibers of Katuki

Figure no. 1: microscopic characters of *Triphaladi Ghana Vati.*

Physio-chemical parameters

Physio-chemical parameters like Loss on drying, Ash value, water soluble extract, methanol soluble extract, pH value and hardness of the Vati are mentioned in table no.3.

Table no. 3: Physio-Chemical Parameters of *Triphaladi Ghana Vati.*

S.N.	Parameters	Result
1	Loss on drying	14.278 % w/w
2	Acid value	8.170 % w/w
3	Water soluble extract	53.4%
4	Methanol soluble extract	59.7%
5	pH value	6.5
6	Hardness of the Vati	3.8

High performance thin Layer Chromatography (TLC) of *Triphaladi Ghana Vati*

Densitometry scanning of the HPTLC pattern showed 8 spots at corresponding Rf values 0.03, 0.25, 0.44, 0.46, 0.65, 0.68, 0.72, 0.73 in short wave UV 254 nm and 12 spots at corresponding Rf values 0.12, 0.19, 0.23, 0.31, 0.35, 0.39, 0.42, 0.54, 0.65, 0.75, 0.80, 0.90. obtained in long wave UV 366 nm (Table 4). Though it is not possible to identify particular chemical constituent from the spot obtained, the pattern may be used as a reference standard for further quality control researches.

Table no. 4: TLC profile / Rf values of *Katuki Vati.*

Extract	Solvent system	Wave length	No of Spots	Maximum Rf value
Methanol extract	Toluene: ethyl acetate: Acetic acid (14: 4: 2)	At 254 nm	8	0.03, 0.25, 0.44, 0.44, 0.65, 0.68, 0.72, 0.73
		At 366 nm	12	0.12, 0.19, 0.23, 0.31, 0.35, 0.39, 0.42, 0.54, 0.65, 0.75, 0.80, 0.90.

DISCUSSION

The study on *Triphaldi Ghana Vati* marks a significant advancement in the pharmacognostic and pharmaceutical standardization of this herbal formulation. The pharmacognostic analysis identified key diagnostic features, such as the fiber of *Amalaki*, scleroids and tannin content of *Haritaki*, bibi-pitted stone and trichomes of *Bibhitaki*, cork fibers of *Nimba*, crystal fibers and septate fibers of *Patola*, as well as acicular and prismatic crystals of *Manjistha*. These findings confirm the presence of all the raw herbal ingredients in the final product, with no substantial changes observed in the microscopic structure of the raw materials during the preparation of the Vati. This ensures both the authenticity and integrity of the final formulation.

The findings further demonstrate that *Triphaladi Ghana Vati* is devoid of undesirable organic compounds, and the production facility upheld stringent cleanliness standards, remaining free from dust and other contaminants. The physico-chemical characteristics of the formulation were found to fall within acceptable parameters, with a loss on drying of 14.27% w/w, an ash value of 8.17% w/w, a water-soluble extract content of 53.4% w/w, a methanol-soluble extract content of 59.7% w/w, a pH of 6.5, and a Vati hardness of 3.8. These values attest to the formulation's quality and consistency.

Additionally, the HPTLC analysis revealed eight distinct spots at 254 nm and twelve at 366 nm, indicating the presence of specific bioactive compounds that may play a role in the therapeutic effects of *Triphaladi Ghana Vati*. The HPTLC fingerprint serves to support the standardization process and provides a reliable reference for future quality control.[7] Overall, the results of this study affirm that the quality of *Triphaladi Ghana Vati* is thoroughly standardized, ensuring its safety, efficacy, and reproducibility for clinical application. This standardization not only enhances the therapeutic potential of *Triphaladi Ghana Vati* but also fosters greater acceptance and credibility of *Ayurvedic* formulations within contemporary pharmacological practice.

CONCLUSION

The pharmacognostical and physico-chemical analyses of *Triphaladi Ghana Vati* have validated the purity and authenticity of the formulation. In the absence of an established fingerprint for this specific formulation, this study represents a pioneering initiative to establish comprehensive pharmacognostical and physico-chemical profiles for *Triphaladi Ghana Vati*. The results offer valuable insights into the composition and quality of the drug,

significantly contributing to its standardization. The data derived from this study can serve as a reference for future quality control and standardization efforts, while also laying the groundwork for further research into the therapeutic efficacy of *Triphaladi Ghana Vati.* This research is essential for ensuring the formulation's consistency, safety, and reliability, thereby promoting its acceptance in clinical and regulatory contexts.

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