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Pharmaceutico-Analytical Profile of a Substantial Formulation Gorakhamundi Ghanavati

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Abstract: Ayurveda primarily emphasizes Swasthasya Swastharakshanam (preserving the health of a healthy person) and Aaturasya Vikara Prashamanam (treating the diseased person). Regarding Dravyaguna, a comprehensive understanding of Ayurvedic principles is imperative. Although Dravyaguna isn't listed as a separate limb within the eight branches of Ayurveda, it is inherently intertwined with each limb, as the knowledge of medicinal substances permeates all aspects of Ayurvedic practice. Thus, Dravyaguna serves as a foundational aspect without which the other branches would lack completeness.

Dravyaguna is a branch of Ayurveda that focuses on the properties and actions of drugs, particularly herbs and Ayurvedic formulations. It encompasses scientific knowledge related to these substances, including their nature, names, properties, and pharmacological effects. This field delves into pharmacognosy, which is the study of medicinal plants, and pharmacology, the study of drug actions. It also explores the therapeutic uses of Ayurvedic drugs. Dravyaguna aims to understand the relationship between the actions and properties of Ayurvedic medications, providing valuable insights into their efficacy and applications in healthcare. Bhaishajya Kalpana is the science that deals in detail with the preparation of different medicines through various methods. These methods aim to make the formulation more palatable, improve its shelf life, and enhance its organoleptic characteristics.

One such drug that has been commended for its therapeutic usefulness in both classical and modern medical science is *Sphaeranthus indicus* Linn, known as Gorakhamundi in Ayurvedic classics. The most important dose form in the realm of Ayurvedic pharmaceuticals is kwatha kalpana. However, it has drawbacks such as a shorter shelf life, bitter flavor, and challenges with preparation, shipping, and storage. To overcome these issues without sacrificing therapeutic efficacy, Kwatha Kalpana is being transformed into Ghanvati. The goal of this work is to create a pharmaceutico-analytical profile of Gorakhmundi Ghanavati

Aims and Objectives: **1.** Prepare Gorakhmundi Ghanavati.
2. Carry out pharmaceutico-analytical evaluation.

Materials and Methods: The study involves the preparation of Gorakhmundi Kasahaya and its conversion into ghanavati. Subsequently, a complete analytical profile of the prepared drug is conducted.

Result and Conclusion: Physico-chemical analysis indicates that all test parameters are within API limits, ensuring the safety and purity of the drug.

Keywords*:* Gorakhmundi, Ghanavati, Kashaya, PLIM guidelines.

Introduction

Ayurveda, an ancient medical science, boasts an extensive repository of medicinal wisdom accumulated over millennia. This venerable tradition offers a plethora of herbal formulations enriched with beneficial constituents capable of addressing a wide spectrum of ailments. Among these, **Gorakhamundi** (*Sphaeranthus indicus Linn*.)

has historically played a pivotal role in traditional medicine, particularly in treating conditions originating in the neck region, such as **Galaganda**, **Gandamala**, and **Apachiroga**.

Mundi, a well-described plant in Ayurveda classics, has a botanical source as ***Sphaeranthus indicus* Linn.**, commonly known as **East Indian Globe thistle**. It is an annual herb belonging to the family **Asteraceae**. This herb is globally distributed from Africa to Australia. Within India, it is found throughout tropical parts, especially in rice fields, dry waste places, and cultivated lands.

In Ayurveda, this herb is described by the name **Mundi**, and it is indicated in the management of various disorders, including **Atisara** (diarrhea), **Ama Vata** (arthritis), **Apasmar** (epilepsy), **Kasa** (cough), **Krimi** (worm infestation), **Mutrakriccha** (diseases of the urinary tract), **Pandu** (anemia), **Pleeharoga** (diseases of the spleen), **Rakta dhatu vikara** (hematological diseases), **Shleepada** (filariasis), **Unmada** (psychosis), **Chhardi** (hyperemesis), **Vata rakta** (gout and related diseases), **Vidradhi** (internal and external abscess), **Vrana** (wound) and **Yoniroga** (diseases of the female genital tract).

In the current research study, the drug considered is **Gorakhmundi**, which is processed into **Gorakhmundi Ghana Vati**. Although there is no direct classical reference for the preparation of **Ghanavati**, the concept of **Ghana** is derived from **Kashaya Kalpana**. It can be considered a secondary preparation of **Kwatha Kalpana**.

In the **Sharanghadhara Samhita**, in the context of **swarasa kalpana**, Acharya Sharangadhara mentioned **Alambusha** (*Sphaeranthus indicus Linn.*), which is beneficial in warding off **Apachi**, **Ganda Mala**, and **Kamala**. **Alambusha** is synonymous with **Gorakhamundi**. The current research study focuses on the pharmaceutical preparation of **Gorakhmundi Ghanavati** and its analytical evaluation.

Rasakriya, a concept mentioned in the **Sharanghdara Samhita**, involves boiling and reducing any liquid preparation over mild fire to achieve a thicker consistency. The resulting thicker drug mass is called **Rasakriya**, which is synonymous with **ghanasara**, **ghanasattva**, and **ghanavati**. **Ghana**, a concentrated dosage form, represents a modified variant of **Kwatha Kalpana**, primarily designed for internal administration. In the current study, the suitable dosage form selected is **Vati Kalpana**.

Vati Kalpana assumes paramount importance in Ayurvedic pharmaceutics due to its numerous advantages, including ease of administration, palatability, and a convenient form for dispensing and transportation. **Vati** is a solid dosage form of medication prepared by liquefying **guda**, **sarkara**, **guggulu**, etc.

In light of these considerations, this study aims to prepare **Ghanavati formulations** utilizing **Gorakhamundi** for straightforward administration in the treatment of **Hypothyroidism**. The prevailing article describes the preparation of **Gorakhmundi Ghana Vati** and its analytical profile. The physico-chemical analysis of **Gorakhmundi Kashaya Ghanvati** revealed that all test parameters were within **API limits**, ensuring the safety and purity of the drug.

Materials and Methods

The study was divided into two main segments:

1. **Pharmaceutical Study**:

a. **Procurement of Raw Material**:

- **Gorakhmundi** (*Sphaeranthus indicus Linn.*) fruits containing seeds were collected from local markets in Vadodara, Gujarat.

b. **Identification and Authentication of Drugs**:

- The collected raw drug was identified and authenticated in the Department of Dravyaguna at **Parul Institute of Ayurveda** by experts as **Gorakhmundi** (*Sphaeranthus indicus Linn.*). Based on macroscopic examination of the herbarium sample through internal Standard Operating Procedure (SOP), it was authenticated and certified as ***Sphaeranthus indicus*** by **Biotrik Organization Private Limited**, Midnapur, West Bengal. Later, it was undertaken for pharmaceutical study.

c. **Preparation of Ghanavati**:

- The preparation of **Gorakhamundi Ghanavati** was carried out at the **GMP Certified – Parul Ayurved Pharmacy**, **Parul Institute of Ayurved**, Limda, Vadodara, Gujarat.
- The following steps were involved in the preparation of **Ghanavati**:

a. **Preparation of Gorakhmundi Kwatha**

b. **Preparation of Gorakhmundi Ghana**

c. **Preparation of Gorakhmundi Ghanavati**

Preparation of Decoction (Kwatha):

The dry Gorakhmundi fruits containing seeds, collected from the local market, were cleaned with tap water and coarsely powdered in a disintegrator. Sixteen parts of water were added, and the mixture was subjected to mild heat with infrequent stirring (without covering its mouth). Reduction was done until the quantity reduced to 1/8th of its original volume, and the contents were filtered through double-folded clean cotton cloth into a stainless-steel vessel. The residue was discarded.

Preparation of Ghana:

The previously prepared **Gorakhmundi Kwatha** was used for the preparation of **Gorakhmundi Ghana**.

The kwatha was subjected to reboiling with intermittent stirring over a mild flame until the contents became semisolid. Then, the contents were indirectly heated on a water bath with constant stirring to avoid burning. Heating was stopped when most of the water evaporated.

Ghana was collected in a stainless-steel plate and dried in a hot air oven, maintaining a temperature around 50°C. The resulting dark brown Ghana had a semi-solid (pouring) consistency and was sticky in nature.

Preparation of Pills (Ghanavati):

- Pills (Vati) were meticulously crafted from Ghana, adhering to the guidelines provided in classical texts.

- The Ghana was converted into granules by forcing the solid mass (Ghana) through 16 sieves.
- The rounded Vatis were then dried in a tray-dryer for 10 to 12 hours at a temperature not exceeding 50°C to 60°C.
- After that, the formulation was compacted to a desired weight of 500 mg using a single punch press.
- The Vatis should be kept away from light and moisture by being tightly packed in airtight containers.

d. **Physio-chemical Analysis**:

- The physio-chemical analysis of **Gorakhmundi Ghanavati** was conducted at **Vasu Research Centre**, Makarpura, Vadodara, Gujarat, India, following standardized procedures.
- The following parameters, explained in the result section, were followed as per the **PLIM guidelines**:

I. Organoleptic analysis (Tablet description, Diameter, Width).
II. Physicochemical parameters (Hardness, Average weight, Friability, Disintegration time, Water Soluble Extractive, Total ash).
III. HPTLC (High-Performance Thin-Layer Chromatography).

Results:

I.Pharmaceutical Study

Table No: 01 Pharmaceutical study observations

Gorakhmundi(GM) Kwatha Choorna Preparation	
Weight of Gorakhmundi fruit with seeds taken	30kg
Weight of GM kwatha choorna	29.720kg
Loss in gms	280gms
Gorakhmundi Kwatha Preparation	
Initial quantity of Kwatha churna taken (kg)	29.720kg
Total quantity of water taken(litres)	475 litres
Total time taken for Kwatha (hrs)	10-12hrs
Final quantity of Kwatha obtained (litres)	58.5 litres
Colour	Dark Brown
Gorakhmundi Ghanavati Preparation	
Total quantity of kwatha obtained in litres	58.5 litres
Total quantity of GM ghana obtained in kg without drying	14.6kg
Total time taken for drying	10 days
Total quantity of GM ghana obtained in kg after drying	5.9kg
Gorakhmundi Ghanavati (GG) Preparation	

Quantity of GM ghana	5.9kg
Final quantity of tablet obtained (kg)	5.5kg
Loss in residue in tablet making	400grams

II. Physio-chemical analysis of Gorakhmundi Ghanavati (GG)

a. Organoleptic Characteristics:

Table No: 02 Organoleptic Characteristics

Sl No:	Parameter	Features observed
1	Colour	Dark brown
2	Taste	bitter
3	Shape	round
4	Smell	characteristic
5	Touch	Rough, hard
6	Diameter	11.16mm
7	Width	7.09mm

b. Physio-chemical Analysis:

Table No: 03 Physio-chemical analysis

Sl No:	Parameters	Results
1	Uniformity of Weight	714.9 mg
2	Total ash value	15.6 %
3	Acid insoluble ash	7%w/w
4	Loss on drying	0.62%w/w
5	Water soluble extract	75.30 %
6	Friability	0.93 %
7	Hardness	4.9 kg/cm^2
8	Disintegration time	27 in 46 sec

c. Phyto constituent Assay of Gorakhmundi Ghanavati

Table No: 04 Phyto constituent Assay of Gorakhmundi Ghanavati

Sl No:	Parameters	Gorakhmundi Ghanavati
1.	Alkaloid	+

2.	Glycoside	-
3.	Flavonoids	++
4.	Tannins	+++
5.	Saponins	-
6.	Steroids	++
7.	Triterpenoids	++
8.	Carbohydrates	+
9.	Protein	-
10.	Starch	-

d. HPTLC screening of Gorakhmundi Ghanavati:

It is one of the sophisticated instrumental techniques for qualitative and quantitative analysis of the herbs and herbal drugs. In the current research study, the quantification of the phyto-constitutents has not been carried out.

Preparation of Test Solution (T):

The chromatographic techniques are detailed in the Materials & Methods section. We used a solvent system designed for HPTLC: Toluene (7): Ethyl acetate (2): Glacial acetic acid (1) for HPTLC studies. Preparation of Spray Reagent (Anisaldehyde-sulfuric acid reagent):

Details of HPTLC profile of all tracks at 254 nm.

Under the 254 nm wavelength - Track -1 of G.G.- 5 spots were detected and starts with respect to retardation factor 0.12, 0.44, 0.56, 0.73 and 0.79.

Details of HPTLC profile of all tracks at 366 nm.

Under the 366 nm wavelength - Track -1 of G.G.- 6 spots were detected and starts with respect to retardation factor 0.56, 0.60, 0.70, 0.73, 0.79 and 0.83.

Details of HPTLC profile of all tracks at 540 nm.

Under the 540 nm wavelength - Track -1 of G.G.- 6 spots were detected and starts with respect to retardation factor 0.12, 0.34, 0.44, 0.56, 0.73 and 0.79.

Discussion:

Kwatha Kalpana is one of the most important primary preparations among **Panchavidha Kashaya Kalpana**. By adhering to basic principles, modifying a drug becomes essential. In the current research study, the concept of **Ghanavati** was introduced due to factors such as diminished shelf life, unpalatability, and dosing challenges. **Gorakhmundi** (*Sphaeranthus indicus*) plays a pivotal role in treating **granthi** disorders. The phytoconstituent assay revealed the presence of **tannins**, **alkaloids**, **flavonoids**, and **triterpenoids**. The **total ash content** indicates the presence of contamination, substitution, or adulteration. A lower total ash value suggests a

reduced amount of inorganic matter and silica content. In this case, the total ash percentage for **Gorakhmundi Ghanavati** is **15.6% w/w**, which falls within the permissible range as per the **API** (not exceeding 23%). The current study aimed at the pharmaceutical preparation of **Gorakhmundi Ghanavati** and its physico-chemical analysis.

Conclusion:

The current research study involved the pharmaceutical preparation of **Gorakhmundi Ghanavati** and its physico-chemical analysis. In the current scenario, modified dosage forms play a vital role in terms of product stability, user-friendliness, and palatability. Staying true to classical principles, **Ghanavati** was selected. Before delving into the formulation aspect, ensuring the quality of the chosen drug is a cardinal step, and it has been well executed in this study. **Gorakhmundi Ghanavati** was prepared following classical textual standard operative procedures mentioned in ancient texts. The raw drugs were identified and authenticated beforehand. The prepared drugs underwent phytochemical analysis, organoleptic analysis, physicochemical analysis, and **HPTLC**. The organoleptic nature revealed the basic characteristics of the formulation. This study aims to establish the groundwork for the standardization of **Ghanavati** formulations, providing baseline data for exploring the therapeutic aspects of **Gorakhmundi Ghanavati**.

Conflict of Interest: None.

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