Published online in http://ijam.co.in ISSN No: 0976-5921

International Journal of Ayurvedic Medicine, Vol 12 (1), 144-147

Pharmaceutical Analysis of Guduchi-Bhadramustadi Ghanvati: An Ayurvedic Formulation for Dyslipidemia

Research Article

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Abstract

Ayurveda a science life which deals the maintenance of health and treatment for the diseases manifested in the human body. In Ayurveda many herbal and herbo-mineral formulations have been explained for disease treatment. *Guduchi-Bhadramustadi yoga* is herbal formulation explained in classical which consists of five herbal medicines and it has been converted in to *Ghanavati* form by following the sop in GMP certified pharmacy. It is a classical preparation used in the management of *Kapha Dosha Vikaras* by practitioners. Material & Methods: The present study was aimed to recognize the constituents of *Guduchi-Badraustadi Ghanavati* by using physico-chemical parameters, Qualitative analysis and Chromatography (HPTLC). Conclusion: This study will be useful for standardization of *Guduchi-Badramustadi Ghanavati* and for the preparation of the monography of this formulation for the Ayurvedic Formulary of India (AFI).

Key Words: *Guduchi-Bhadramustadi Ghanvati, Dyslipidemia, HPTLC.*

Introduction

Ayurveda is science which deals with diseases management and promotion of health. Many ayurvedic formulation have been explained in classics which includes herbal, herbo-mineral and mineral. In present era herbal formulation are widely used and promoting globally for the treatment of many diseases(1). Considering these points, the Standardization of herbal formulations is crucial for the assessment of drug quality. It is also important to know the active principles and its chemical constituents of the herbal formulation. The acceptability and safety of the drug depends on the quality the formulation(2). So, it is important to do quality assessment of the formulation. One of the major problems faced by Ayurveda physicians is the lack of unique quality control parameters for herbal medicines and their formulations. In India, the Department of AYUSH Government of India has launched a central scheme to develop standard operating procedures for the manufacturing process in order to develop pharmacopoeial standards for Ayurvedic preparations(3). In present era formulation needs to be standardized so it can get acceptance globally. This formulation has been explained in classics for the mangement of sthoulya(4). In this present study, *Guduchi- Badramustradi Ghanavati* was prepared following the standard operating procedures in GMP certified pharmacy. This formulation is commonly used in clinical practice for the treatment of *Rasa pradoshaja* diseases. Since the therapeutic values and efficacy of the formulation depend on the several aspects, the present study has taken up for pharmaceutical analysis.

The analytical study of the *Ghanavati* was performed with following parameters: Organoleptic parameters (Appearance, color, odor, taste), physio-chemical parameters (Loss on drying, Total ash, Acid insoluble ash, Water soluble extract, Alcohol soluble extract, pH, Uniformity of weight, Friability, Hardness, Disintegration time), qualitative and HPTLC.

Aims and Objectives

- Identification and authentication of raw drugs used for *Guduchi Badamustadi Ghanavati.*
- Preparation of *Guduchi Badramustadi Ghanavati* at GMP certified pharmacy.
- Physicochemical, phytochemical and HPTLC analysis of *Guduchi Badamustadi Ghanavati.*

Materials and Methods

Collection Plant Material

Musta (*Cyperus Rotundus.Linn*), *Guduchi* (*Tinospora Cordifolia. Thumb*), *Amalaki* (*Emblica officinalis. Gaertn*), *Vibheetaki* (*Terminalia Bellerica. Gaertn*), *Haritaki* (*Terminalia Chebula. Retz*) were purchased from authenticated resources at Vadodara.

Identification and Authentication of Raw Drugs

Raw drugs identification and authentication was done by the Department of *Dravya guna,* Parul Institute of Ayurveda, Parul University, Vadodara.

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Method of preparation *Guduchi-Bhadramusthadi Ghanvati*

The ingredients of *Guduchi Badramustadi Ghanavati* (Table 1) were taken in equal quantity and converted into coarse powder. The coarse powder was well mixed in a mass mixer until a homogenous mixture was obtained. The Kashaya was prepared by obtained mixture and transformed into *Ghana* according to the guidelines given in *Sharangdhar Samhita* (5). Prepared Ghana was kept in a hot oven for 3 days until it was completely dried. The dried Ghana was collected from hot oven after complete drying and table of 500mg were prepared by using tablet pressing machine.

Table 1: Showing Ingredients of *Guduchi-Bhadramusthadi Ghanavati*

Sr. No	Name of Drug	Botanical name	Family	Part used
1	*Amalaki*	*Emblica officinalis Linn*	Phyllanthaceae	Fruit
2	*Haritaki*	*Terminalia Chebula Retz*	Combretaceae	Fruit
3	*Vibheetaki*	*Terminalia bellerica Gaertn*	Combretaceae	Fruit
4	*Guduci*	*Tinospora cordifolia Thunb*	Menispermaceae	Stem
5	*Musta*	*Cyperus rotundus Linn*	Cyperaceae	Rhizome

Methods of evaluation of *Guduchi-Badramustadi Ghanavati*

Guduchi-Badramustadi Ghanavati was analyzed by using standard qualitative and quantitative parameters. All the procedures were conducted at G.M.P certified Parul Ayurvedic Pharmacy Laboratory, Vadodara.

Physico-Chemical Analysis

It includes parameters like colour, taste, pH, Loss on Drying (6), total ash (7), acid insoluble ash(8), alcohol soluble extractive (9), water soluble extractive (10) uniformity of weight (10), disintegration time(11) friability test (12), & hardness (13).

Qualitative analysis

The qualitative analysis (14) of *Guduchi -Bhadramustha Ghanvati* was done for Glycoside Sugar, Alkaloids, Tannins, Flavonoids, Gallic acid, Ascorbic Acid, Saponin, Starch.

Chromatography

HPTLC (high-performance thin layer chromatography) is a sophisticated form of TLC, which works same principles as that TLC i.e., the principle of separation is adsorption. high performance thin layer chromatography (15) gives much greater resolution and separation of components than normal TLC. it uses chromatographic stationary phases with excellent separation efficiency and employs state of the art instrumentation for all steps in the procedure. Method and other procedures followed for HPTLC of *Guduchi Badramustadi Ghanavati* discussed below.

Results and Discussion

The formulation *Guduchi-Badramustadi Ghanavati* was prepared following standard operating procedures in GMP certified pharmacy and was subjected for qualitative and quantitative analysis. The pharmaceutical analysis results were discussed below.

Organoleptic evaluation

The organoleptic parameters are the basic criteria for selecting raw ingredients and confirming the quality of the finished formulation. The texture of the finished formulation was found to be smooth, indicating surface uniformity without cracks. The color was black, the taste was pungent and the smell was slightly aromatic and characteristic due to the special properties of the ingredients used. Table 2

Table 2: Organoleptic Characteristics of *Guduchi-Bhadramusthadi Ghanavati*

SI. No.	Characters	Observed
1	Color	Black
2	Odor	Slightly Aromatic
3	Taste	Pungent

Physico-Chemical Analysis of *Guduchi -Bhadramustadi Ghanavati*

Loss on drying

Drying between samples indicates that the samples are devoid of excess water content and that there is no microbial overgrowth or insect infestation. In the sample of *Guduchi -Bhadramustadi Ghanavati* loss of drying was found to be 2.56 %, which means that the samples have a good shelf-life and will not decay when stored.

Total ash and acid insoluble ash

It provide information on contamination, substitution, adulteration. Low total ash and acid insoluble ash means low levels of inorganic matter and Contents of silica. In this sample, the value of *Guduchi-Bhadramustadi Ghanvati* ash was 1.07%, which was slightly higher and may be due to the presence of fibers and sclereids in the ingredients.

Water and Alcohol soluble extracts

Water soluble extract and Alcohol soluble extract were 81 per cent and 3.86 per cent respectively in the sample of *Guduchi-Bhadramustadi Ghanavati*. The high solubility of the sample in water indicates that the drug is best suited for extraction with water or water-based preparations. The negligible presence of Volatile oils is also in favor of thermal extraction with water.

pH

The pH is measured to detect the acidity or alkalinity of the aqueous solution of the drug, which helps to understand the pharmacological basis of drug absorption and metabolism. In this sample, *Guduchi-Bhadramustadi Ghanavati* pH was 4.9 percent, therefore, it is clear that the drug tested was acidic in nature.

Uniformity of weight

It helps to distribute drugs and to fix the quantity of drugs. The average weight of the present sample of *Guduchi-Bhadramustadi Ghanavati* was 510 mg, which denotes the uniformity of the weight in relation to the planned weight of each *Ghanavati* i.e., 500 mg.

Disintegration time

The disintegration time of this sample was reported to be 36 minutes. Disintegration time of the tablet is an important criterion for quality assessment, as it provides important clues as to the bioavailability of the contents of the tablet. In further research on the same trial drug, comparative criteria for assessing the quality of the formulation have become essential.

Hardness and friability

The hardness of the tablet should not be less than 3 kg/cm2 whereas the friability is at an ideal level of 1%. The Guduchi-Bhadramustadi Ghanavati sample had a hardness of 5.2 kg/cm2 and was found to have a friability of 0.45 per cent, therefore both values were within the required range indicating the durability of the finished formulation. TABLE 3.

Table 3: Physico-Chemical Analysis of *Guduchi -Bhadramustadi Ghanavati*

Sr. No	Parameter	Value
1	Loss on drying at 105^0 C (%w/w)	2.56
2	Total Ash Value (%w/w)	1.07
3	Acid Insoluble Ash (%w/w)	0.87
4	Water soluble extractive (%w/w)	81
5	Alcohol soluble extractive (%w/w)	3.86
6	pH (5% Aqueous)	4.9
7	Hardness (Kg/cm^2)	5.2
8	Disintegration time (minutes)	36
9	Weight variation	
	Average weight (%w/w)	510 mg
	Highest weight (%w/w)	3.34
	Lowest weight (%w/w)	1.45
10	Friability Test (%w/w)	0.45

Qualitative analysis: *Guduchi -Bhadramustadi Ghanavati* was subjected for the qualitative analysis to identify the active principles of the formulation which shows presence of alkaloids, tannin, saponin, ascorbic acid and glycoside sugar as shown in TABLE 4.

Table 4: Showing Qualitative Analysis of *Guduchi-Bhadramustadi Ghanavati*

SR. NO.	Solvent	Present (+) / Absent (-)
1	Glycoside Sugar	+
2	Alkaloids	+
3	Tannin	+
4	Saponin	+
5	Ascorbic Acid	+
6	Gallic Acid	+
7	Starch	+
8	Triterpenoid	-

Chromatography

It was carried out at Vasu Research Centre, Vadodara. HPTLC fingerprinting report was done to analyze the finished formulation *Guduchi-Bhadramustadi Ghanvati*.

High-Performance Thin Layer Chromatographic Study

Prepare the sample: Weigh in a conical flask: Weigh in two glass 2 g of the sample, then apply 20 ml of methanol. 1 hour of reflux in a warm bath When the timer goes off, use Whatman filter paper No. 1 to filter. Place the filter in an evaporating dish and evaporate it until it is fully dry. 5 mL methanol to reconstitute the sample as a result, you will use the test solution for HPTLC fingerprinting. Spray reagent (Anisaldehyde – Sulphuric acid reagent) preparation: A mixture of 0.5 mL anisaldehyde, 10 mL glacial acetic acid, 85 mL methanol, and 5 mL is prepared.

Chromatographic condition: HPTLC chromatographic condition details have been mentioned in Table no.5.

Table 5: Showing Chromatographic Conditions of *Guduchi-Bhadramusthadi Ghanavati*

Chromatographic Conditions:	
Application Mode	CAMAG Linomat 5 – Applicator
Filtering System	Whatman filter paper No. 1
Stationary phase	MERCK – TLC / HTPLC Silica gel 60 F_{254} on Aluminium Sheets
Application (Y axis) Starting Position	10 mm
Development End Position	80 mm from plate base
Sample Application Volume	2.0 µL
Development Mode	CAMAG TLC Twin Trough Chamber
Chamber Saturation Time	30 minutes
Mobile Phase (MP)	Toluene: Ethyl Acetate: Formic Acid (7:3:1)
Visualization	@ 254nm, @ 366 nm and @ 540 nm (after derivatization)
Spray Reagent	Anisaldehyde Sulphuric Acid reagent
Derivatization mode	CAMAG – Dip tank for about 1 min
Drying Mode, Temp. & Time	TLC Plate Heater Preheated at 100±5^{0}C for 3 minutes

HPTLC details at different Rf

After derivatization, plate was examined for appearance of different bands at different R_f. and following were the findings:

Details of HPTLC profile of all tracks @ 254 nm**:** Under the 254 nm wavelength-Track -T1 *of Guduchi-Bhadramustadi Ghanvati*, 7 spots were detected and starts with respect to retardation factor 0.27,0.39,0.45,0.54,0.59,0.64 and 0.78.

Details of HPTLC profile of all tracks at 366 nm. Under the 366 nm wavelength-Track -T1 of *Guduchi-Bhadramustadi Ghanvati* , 6 spots were detected and starts with respect to retardation factor 0.19,0.32,0.59,0.64,0.78 and 0.81.

Details of HPTLC profile of all tracks at 540 nm: Under the 540 nm wavelength-Track -T1 of *Guduchi-Bhadramustadi Ghanvati*, 5 spots were detected and starts with respect to retardation factor 0.27,0.39,0.45,0.63 and 0.78**.**

HPTLC, which was generated @ 254 nm, @ 366 nm and @ 450 nm after the derivatization, revealed that the presence of 7spots, 6 spots and 5 spots at each wavelength respectively. Thus, the formulation is rich in phytoconstituents.

Conclusion

The Ayurvedic system of medicine is increasingly being relied on for various health issues, particularly lifestyle diseases. The ingredients have been pharmacognostically identified and authenticated and used for preparation. Any plant or formulation used medicinally requires a detailed study prior to its use, as the therapeutic efficacy depends on the quality of the ingredients used for the preparation of the medicinal product. The prepared drug, *Guduchi-Badramustadi Ghanavati* was pharmacologically subjected for physicochemical analysis, qualitative and HPTLC. The ingredients of *Guduchi-Badramustadi Ghanavati* are *guduchi, musta, amalaki, haritaki* and *vibhitaki* and it is an herbal formulation.

In this study, *Guduchi-Bhadramustadi Ghanavati* was prepared in accordance with the classical references and following standard operating procedures at GMP certified pharmacy. Raw drugs were identified and authenticated prior to use for preparation. The drug was pharmacologically subjected to physicochemical analysis, qualitative and HPTLC analysis. The groundwork requirements for standardization of *Guduchi-Bhadramustadi Ghanavati* have been attempted in this study. In the future, this study will help to standardize *Guduchi-Bhadramustadi Ghanavati* and to prepare the monograph of this for Ayurvedic Formula of India (AFI).

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