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PHARMACOGNOSTICAL AND PHARMACEUTICAL ANALYSIS OF *KHADIRASHTAKA GHANAVATI*- AN AYURVEDIC POLYHERBAL FORMULATION

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ABSTRACT

Khadirashtaka is a renowned formulation consisting of eight herbal drugs which had been mentioned in the context of treatment of skin disorders in various classical texts of Ayurveda like *Yogaratnakara, Vangasena, Vrindamadhava, Chakradatta etc.* Even though the combination had been suggested in the form of decoction in the classical texts, it is converted into the tablet (*Ghanavati)* form for addressing palatability issues and proper dose fixation. **Methods:** The finished product is subjected to microscopic evaluation, physic-chemical analysis like hardness, weight variation, loss on drying, ash value, Ph value, water soluble extract, alcohol soluble extract, High Performance thin layer chromatography(HPTLC) etc. **Results:** Pharmacognostical study showed the presence of certain identifying characters of all of the eight ingredients in the formulation like cork cells of *Khadira*, Crystal fibers of *Nimba*, scleroids of Haritaki, Bibhitaki and Amalaki, pitted vessels of patola, starch cells of guduchi, multicellular trichome of vasa etc. Preliminary physico-chemical analysis showed that hardness 3.5 Kg/cm^2, ash value 14.88%, loss on drying 12.95%, water soluble extract 35.15 and HPTLC showed two spots in 254nm and one spot in 366nm. **Conclusion:** Present work was carried out to standardize the finished product *Khadirashtaka Ghanavati* in terms of its identity, quality and purity. Pharmacognostical and Physico-chemical observations revealed the specific characters of all active constituents in the preparation.

KEYWORDS: *Khadirashtaka, Ghanavati*, pharmacognosy, pharmaceutical, HPTLC.

INTRODUCTION

Khadirashtaka refers to a combination of eight herbal drugs namely *Khadira* (*Acacia catechu* (Linn.f) Willd), *Haritaki* (*Terminalia chebula* Retz), *Bibhitaki* (*Terminalia bellerica* Roxb.), *Amalaki* (*Embilica officinalis* Gaertn), *Nimba (Azadirachta indica A.Juss), Patola (Trichosanthes dioica Roxb.), Guduchi (Tinospora cordifolia (Willd.)Miers) and vasa(Adhatoda vasica Nees). It is explained as an ideal formulation for different kinds of skin disorders in the classical texts of Ayurveda like Yogaratnakara,*[1] *Vangasena., Chakradatta, Vrinda Madhava, Vaidya Chintamani, Sahasrayoga ,Bharata Bhaishajya Ratnakara* etc. In *Ayurvedic* parlance, the combination is having *Tikta (bitter) and Kashaya (astringent) taste, Laghu* (light) and *Rooksha* (rough) properties. The formulation is having the action of pacifying all three *Doshas (Vata, Pitta, Kapha)* and mainly *Kapha-pittahara (pacifying Kapha and Pitta)*. *Kushta* (skin disorders), *Kandu*(itching), *Visphota*(eruption) are the main indications of *Khadirashtaka,*[2] explained in all of the above mentioned classical texts. Apart from these general therapeutic uses, *Vangasena* explains some specific indications like *Visarpa, Pama, Kitibha, Shitapitta, Masoorika.*[3] *Bharata Bhaishajya Ratnakara* mentioned its special therapeutic uses in *Romantika* and *Masoorika*.[4] In the classical texts, oral administration of *Khadirashtaka* in the form of *Kwatha* (decoction) is mentioned. But, here for better palatability and standardization of dose, it is converted into *Ghanavati (*tablet) form. The ingredients of *Khadirashtaka Ghanavati* with their proportions are described in Table1. Pharmacognosy is also the first step to standardize a drug which is the need of the day. It should be noted that herbal drug standardization is not new in the field of *Ayurveda*. In the classics it is mentioned in a codified manner, such as *Grahya Lakshana*, Method of collection etc. It is a timely necessity followed by compulsion to go for quality control of the raw drugs as well as final products using modern parameters. This will not only provide a scientific basis and credibility to Ayurvedic drugs and pharmaceutics but also help in the globalization of *Ayurveda.*

AIMS AND OBJECTIVES

1. To evaluate collected raw drugs and *Khadirashtaka Ghanavati* for authenticity through various pharmacognostical procedures.
2. To develop the pharmacognostical and phyto-chemical profile of *Khadirashtaka Ghanavati.*

MATERIALS AND METHODS

Collection, Identification and Authentication of raw drugs

The raw materials were collected from the pharmacy of Gujarat Ayurved University, Jamnagar. All the raw drugs were identified and authenticated in the Pharmacogonosy Department, Institute for Post Graduate Teaching and Research in *Ayurveda*, Gujarat Ayurved University, Jamnagar.

Preparation of Drug

All the ingredient drugs were taken in equal quantity in the *Yavakut* form and *Kwataha* was made as per the classical guidelines. *Kwatha* was heated upto when it is converted into Ghana form and *Ghanavati* is made out of it.

Pharmacognostical study

The Pharmacognostical study comprises of organoleptic study and microscopic study of finished product.

Organoleptic Study

The Organoleptic characters of Ayurvedic drugs are very important and give the general idea regarding the genuinity of the sample. Organoleptic parameters ie. Taste, Colour, odour and touch of *Khadirashtaka Ghanavati* were scientifically studied following standard references.[5]

Microscopic Study

Khadirashtaka Ghanavati was powdered and dissolved with water and microscopy of the sample was done without stain and after staining with Phloroglucinol + HCl. Microphotographs of Khadirashtaka Ghanavati was also taken under Corl-zeisstrinocular microscope.[6]

Physico-chemical analysis

Khadirashtaka Ghanavati was analyzed using various standard physico-chemical parameters. The common parameters mentioned for compressed tablets in Ayurvedic Pharmacopia of India,[7] and CCRAS,[8] guidelines are total ash, pH value and water and alcohol soluble extractives. On this basis these parameters were taken. Presence of more moisture content in a sample can create preser*vati*on problem. Hence loss on drying was also selected as one of the parameters.[10]

High Performance Thin Layer Chromatography (HPTLC)

HPTLC was performed as per the guideline provided by API. Methanolic extract of drug sample was used for the spotting. HPTLC was performed using Toluene +Ethylacetate + Acetic acid (7:2:1) solvent system and observed under visible light. The colour and Rf values of resolved spots were noted.[10]

RESULTS AND DISCUSSION

Organoleptic characters of *Khadirashtaka Ghanavati*

Organoleptic characters contents of *Khadirashtaka Ghanavati* like colour, taste, touch, Odor were recorded and shown in Table- 2.

Microscopic Study

Identifying characters of ingredients of *Khadirashtaka Ghanavati* under the microscope showed cork cells, stone cells, rhomboid crystals and tannin content of *Khadira*, Crystal fibers, prismatic crystals, tannin content and stone cells of *Nimba*, scleroids, epicarp cells and pitted stone cells of *Haritaki*, scleroids and trichomes of *Bibhitaki*, scleroids and silica deposition of *Amalaki*, pitted vessels and simple trichome of patola, starch grains, border pitted vessels, and cork cells of *Guduch*i, multicellular trichome and fragment of cystolith of *Vasa*. All these are showed in Plate 1(a to z).

Physico-chemical analysis

Physico-chemical analysis of *Khadirashtaka Ghanavati* revealed the value as hardness 3.5 Kg/cm^2, ash value 14.88%, loss on drying 12.95%, water soluble extract 35.15%, alcohol soluble extract 18.34%, pH 5.5 are shown in Table –3.

HPTLC Study

The chromatographic study (HPTLC) was carried out under 254 and 366 nm UV to establish fingerprinting profile. It showed 2 spots at 254 nm and 1 spot at 366nm with R_f values were recorded which may be responsible for expression of its pharmacological and clinical actions. Plate 2, Table – 4.

Table 1: Ingredients of *Khadirashtaka Ghanavati.*

Sr.no	Drug	Botanical name	Part used	Ratio
1.	*Khadira*	*Acacia catechu(*Linn.f)Willd	*Sara/twak*	1
2.	*Haritaki*	*Terminalia chebula Retz.*	*Phala*	1
3.	*Amalaki*	*Embilica officinalis* Gaertn	*Phala*	1
4.	*Bibhitaka*	*Terminalia bellerica* Roxb.	*Phala*	1
5.	*Nimba*	*Azadirachta indica* A.Juss	*Twak*	1
6.	*Patola*	*Trichosanthes dioica* Roxb.	*Patra*	1
7	*Guduchi*	*Tinospora cordifolia(Willd.)*Miers	*Kanda*	1
8.	*Vasa*	*Adhatoda vasica* Nees	*Patra*	1

Table 2: Organoleptic parameters of *Khadirashtaka Ghanavati*

Sl. no:	Character	Observation
1	Colour	Black
2	Odour	Slight fragrant
3	Taste	Astringent
4	Touch	Hard

Table 3: Physico-chemical analysis of *Khadirashtaka Ghanavati*

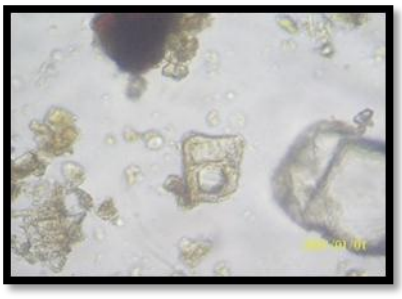
Sl no:	Test	Result
1	Hardness	3.5 kg/cm2
2	Weight Variation	Average Weight-520mg Highest weight-553mg Lowest weight-485mg
3	Ash Value	14.88%
4	Loss on drying	12.95%
5	Water Soluble Extract	35.15%
6	Alcohol Soluble Extract	18.34%
7	pH	5.5
8	Disintegration time	30 minutes

Table 4: HPTLC Study of *Khadirashtaka Ghanavati*

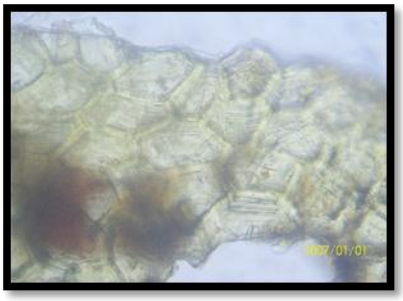
Wave length	Number of spots	R*f* value
254nm	2	0.02,0.09
366nm	1	0.02

Plate no: 1

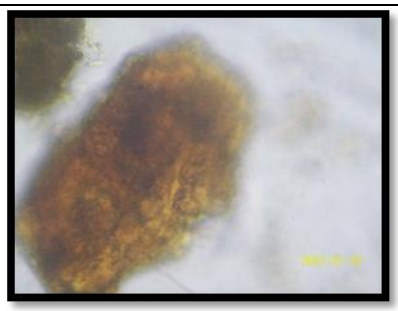
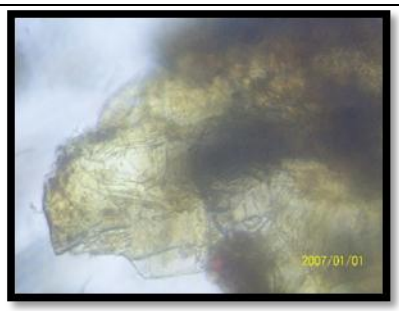
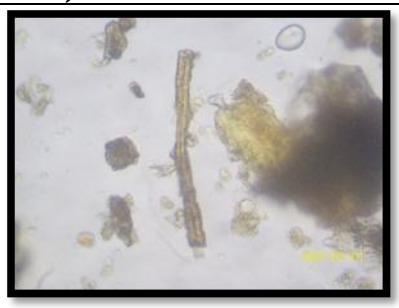
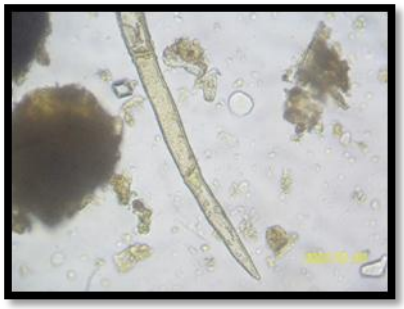
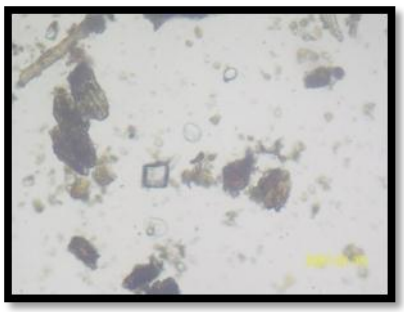
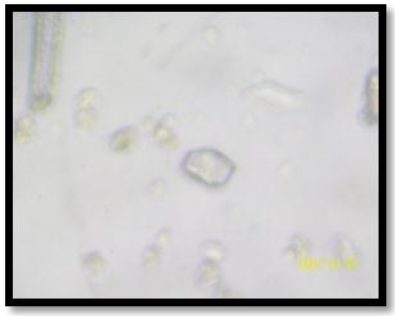
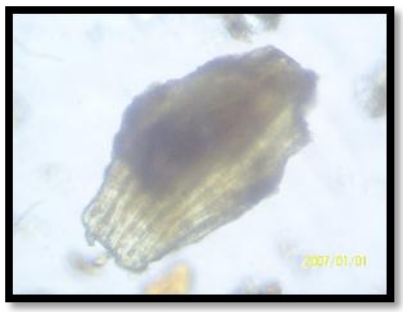
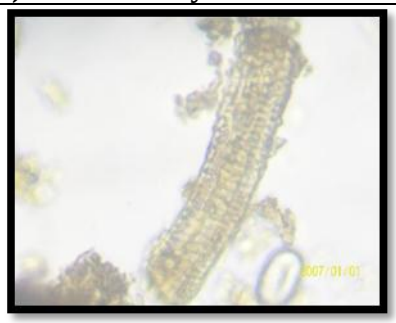
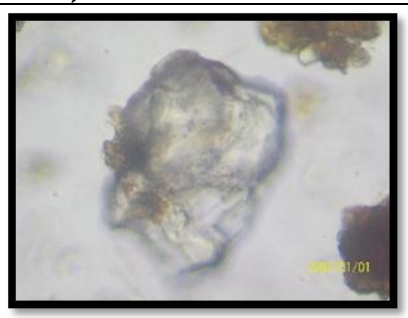
Sample



a)Collenchyma of Guduchi



b)Cork cell of Guduchi

		
c)Cork cell Of Khadira	d)Cork cell of Guduchi	e)Crystal fibre of Nimba
		
f)Epicarp cells of Haritaki	g)Fibre of Nimba	h)Fragment of Cystolith of Vasa
		
i)Multicellular trichome of Vasa	j)Pitted stone cells of Haritaki	k)Pitted vessels of Patola
		
l)Prismatic crystals of Nimba	m)Rhomboid crystals of Khadira	n)Scleroids of Amalaki
		
o)Scleroids of Bibhitaki	p)Scleroids of Haritaki	q)Silica deposition of Amalaki

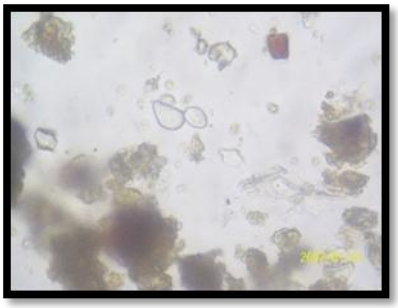
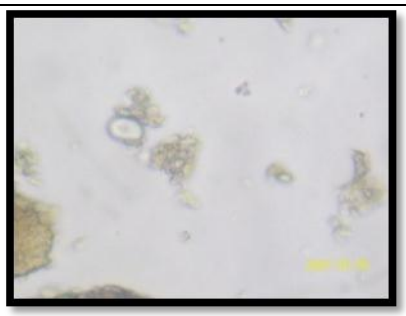
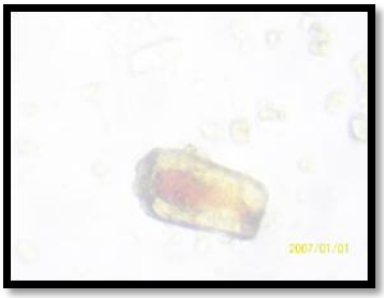
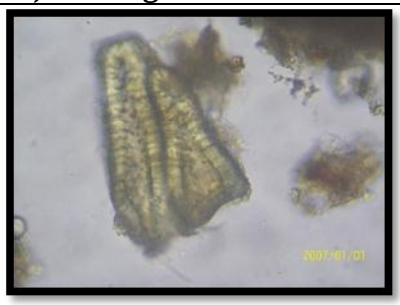
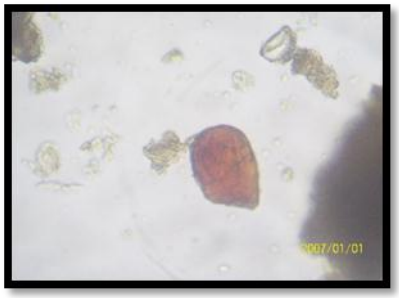
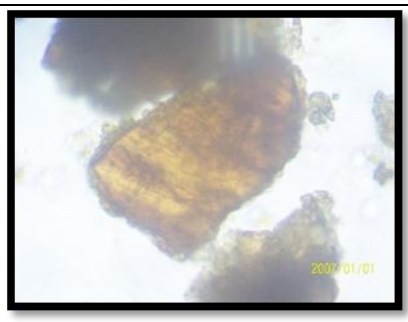
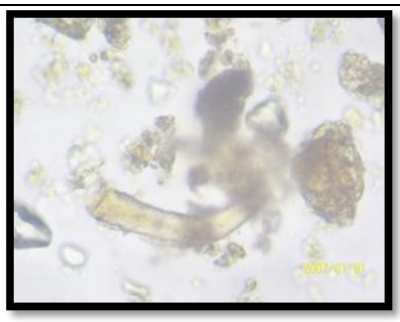
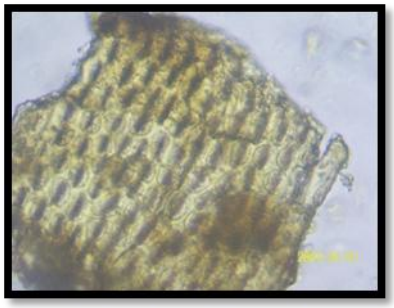
		
r)Simple trichome of Patola	**s)Starch grains of Guduchi**	**t)Starch grains of Guduchi**
		
u)Stone cells of Nimba with tennin content	**v)Stone cells of Khadira**	**w)Tannin content of Khadira**
		
x)Tannin content of Nimba	**y)Trichome of Bibhitaki**	**z)Border Pitted vessesl of Guduchi**

Plate 2: Densitogram of *Khadirashtaka Khanavati* at 254nm and 366nm.

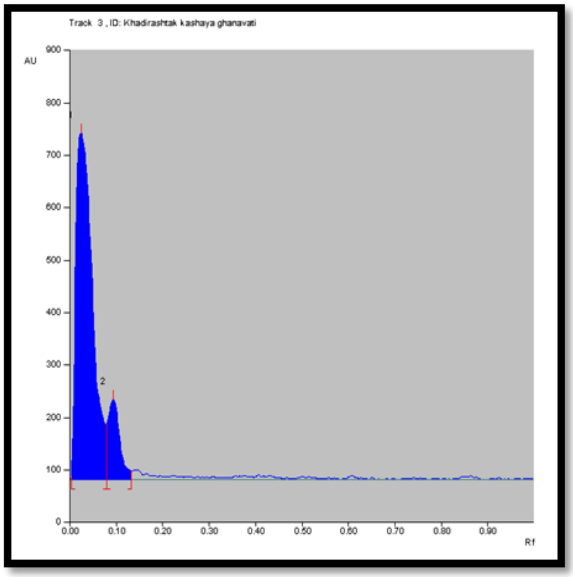
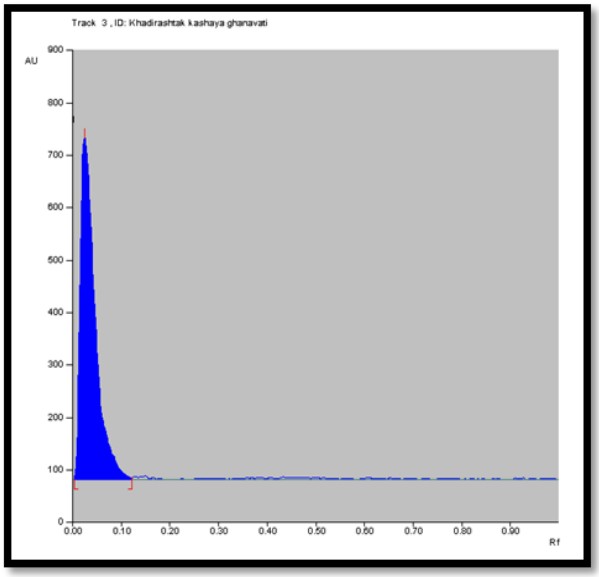
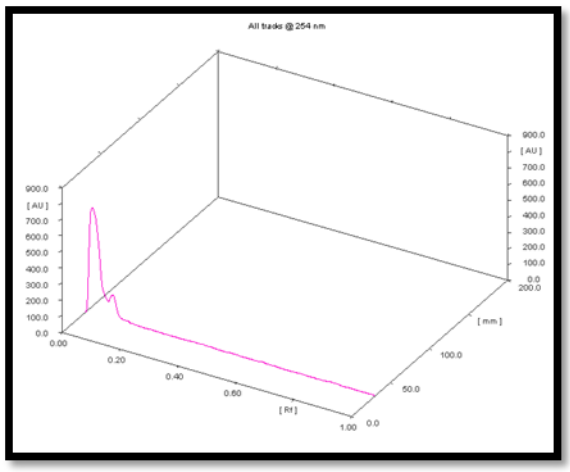
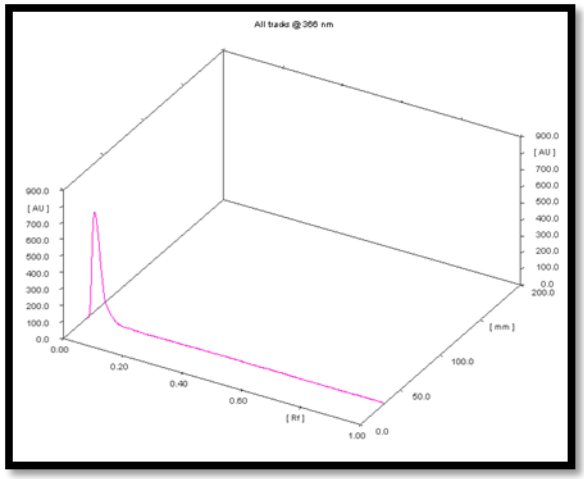
	
Peak Display at 254nm	**Peak Display at 366nm**

Plate 3: Three dimensional HPTLC (3D) Densitogram

	
254 nm	**366nm**

CONCLUSION

The pharmacognostical and physico chemical analysis of *Khadirashtaka ghanavati* confirmed the purity and genuinety of the drug. As there is no published information available on pharmacognostical and physic-chemical profiles of *Khadirashtak Ghanavati*, this preliminary information may be beneficial for future researchers and can be used as a reference standard in the further quality control researchers.

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