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Comparative pharmacognostical and pharmaceutical evaluation of *Khadirashtaka kwatha* and *Khadirashtaka ghanavati* - An ayurvedic formulation

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ABSTRACT

Khadirashtaka Kwatha is an ideal medicine for *Twak vikaras* mentioned in many books of Ayurveda. This formulation consists of eight herbal drugs. **Methods**: Both the finished products (*Khadirashtaka Ghanavati* and *Khadirashtaka Kwatha*) are subjected to pharmacognostical evaluation, physico- 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 of *Khadirashtaka Kwatha* showed that ash value- 8.15%, loss on drying -9.35%, water soluble extract- 14.16%, methanol extract-10.72% and HPTLC showed 12 spots in 254nm and 6 spot in 366nm. **Conclusion:** Present work was carried out to compare the finished products like *Khadirashtaka Ghanavati* and *Khadirashtaka Kwatha* in terms of its identity, quality and purity so as to standardize the better form. Pharmacognostical and Physico-chemical observations revealed the specific characters of all active constituents in the preparations.

Keywords: *Khadirashtaka Kwatha*, *Khadirashtaka Ghanavati*, Pharmacognosy, Pharmaceutics, Comparison.

INTRODUCTION

Khadirashtaka Kwatha is explained as an ideal formulation for different kinds of *Twak Vikaras* (skin disorders) in the classical texts of Ayurveda. *Twak* explained in Ayurveda can be correlated with epithelial lining of cervix. So, by considering this concept, this drug is used in treating cervical erosion. Cervical erosion is one of the commonest gynecological conditions [1] seen in clinical practice in which the squamous epithelium of the ectocervix is replaced by columnar epithelium, which is continuous with the endocervix [2]. It's prevalence is more than 50% of all the gynecological conditions [3]. It is asymptomatic in initial stage but in later stage, it progresses to show many symptoms like white discharge, itching, contact bleeding, dyspareunia etc. It adversely affects the physical health and psychological status of the women. The substance which is obtained by boiling the drug with liquid like milk, water etc. is called as *Kwatha* [4]. *Khadirashtaka Kwatha* is a combination of eight herbal drugs like *Khadira* (*Acacia catechu* (Linn.f) Willd), *Nimba* (*Azadirachta indica* A. Juss), *Patola* (*Trichosanthes dioica* Roxb.), *Guduchi* (*Tinospora cordifolia* (Willd.) Miers), *Vasa* (*Adhatoda vasica* Nees), *Haritaki* (*Terminalia chebula* Retz), *Bibhitaki* (*Terminalia bellerica* Roxb.), *Amalaki* (*Embilica officinalis* Gaertn). This drug has action particularly on *Rasa*, *Rakta* and *Mamsa Dhatu*. Most of the drugs are possessing *Vrana Shodhana*, *Ropana*, *Shothahara*, *Krimighna*, *Rakta Shodhaka* and *Kandughna* properties. The references regarding *Khadirashtaka Kwatha* are available in Ayurveda classics like *Chakradatta*, *Yogaratnakara*, *Vrinda Madhava*, *Vangasena*, *Sahasrayoga*, *Vaidya Chintamani*, *Bharata Bhaishajya Ratnakara* etc. This drug has *Tikta*, *Kashaya Rasa*, *Laghu*, *Rooksha Guna* and pacifies all the three *Doshas* like *Vata*, *Pitta*, *Kapha* but mainly have *Kapha-Pittahara* action. The main indications of *Khadirashtaka Kwatha* as mentioned in the classics are *Kushta*, *Kandu* and *Visphota* [5]. Till date there is no published work on comparative pharmacognostical and phyto-chemical profile of *Khadirashtaka Kwatha* & *Khadirashtaka Ghanavati*.

MATERIAL AND METHOD

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 Pharmacognosy Department, IPGT & RA, Jamnagar.

Method of preparation of drug

All the ingredient drugs mention in the table 1 were taken in equal quantity in *Yavakuta* form and *Kwatha* was made as per the classical guidelines [6].

Pharmacognostical study

The study comprises of organoleptic 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 i.e. Taste, Colour, odour and touch of herbs in *Khadirashtaka Kwatha* & *Khadirashtaka Ghanavati* were scientifically studied following standard references [7].

Microscopic Study

Microscopy of the *Khadirashtaka Kwatha* sample was done without stain and after staining with Phloroglucinol + HCl. Microphotographs of *Khadirashtaka Kwatha* & *Khadirashtaka Ghanavati* was also taken under Corl-zeisstrinocular microscope [8].

Physico-chemical analysis

Khadirashtaka Kwatha & *Khadirashtaka Ghanavati* was analyzed using various standard physico-chemical parameters. The common parameters mentioned for coarse powder in Ayurvedic Pharmacopia of India [9] and CCRAS [10], guidelines are total ash, pH value, water and alcohol soluble extracts. On this basis these parameters were taken. Presence of more moisture content in a sample can create preservation problem. Hence loss on drying was also selected as one of the parameters.

High Performance Thin Layer Chromatography (HPTLC)

HPTLC was performed as per the guideline provided by API. Methanolic extract of the drug sample was used for the spotting. HPTLC was performed using Toluene + Ethylacetate (9:1v/v) solvent system and observed under visible light. The colour and Rf values of resolved spots were noted [11].

RESULTS AND DISCUSSION

Organoleptic characters of *Khadirashtaka Kwatha* & *Khadirashtaka Ghanavati* like colour, taste, touch, odour were recorded and presented in Table 2.

Microscopic Study

Diagnostic characters of *Khadirashtaka Kwatha* & *Khadirashtaka Ghanavati* under the microscope showed border pitted vessels of *Guduchi*, starch grains of *Guduchi*, rhomboidal crystal of *Khadira*, cystolith of *Vasa*, Crystal fibres of *Nimba*, Spiral vessels of *Patola*, Scleroids of *Haritaki & Vibhitaki*, silica deposition of *Amalaki*, collenchyma cells of *Guduchi*, wavy parenchyma cells of *Patola*, Prismatic crystal of *Nimba*, Epicarp cells of *Haritaki*, Cork with tannin content of *Khadira* etc. Both the formulations showed similar characters as shown in Plate 1.

Physico-chemical analysis

Physico-chemical analysis of *Khadirashtaka Kwatha* & *Khadirashtaka Ghanavati* revealed the value as, total ash value 8.15% & 14.88%, loss on drying 9.35% &12.95%, respectively & others are presented in Table 3.

HPTLC Study

The chromatographic study (HPTLC) was carried out under 254 and 366 nm UV to establish finger printing profile. It showed 2 spots at 254 nm and 1 spot at 366nm with R_f values 0.02, 0.09 & 0.02 in *Khadirashtaka Ghanavati* sample and 12 spots at 254nm with R_f values 0.03,0.10,0.20,0.24,0.29,0.38, 0.49,0.53, 0.66, 0.77, 0.85,0.90 & 6 spots at 366 nm with R_f values 0.03,0.14,0.35,0.48,0.53,0.90 in *Khadirashtaka Kwatha* sample were recorded which may be responsible for expression of its pharmacological and clinical actions. Plate 2 and 3, Table 4.

Table 1: Ingredients of *Khadirashtaka Ghanavati* & *Khadirashtaka Kwatha*

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

Table 2: Orgnoleptic characters of *Khadirashtaka Ghanavati* & *Khadirashtaka Kwatha*

Sr. No	Character	Observation	
		Khadirashtaka Ghanavati.	***Khadirashtaka Kwatha***
1.	Colour	Black	Light brown
2.	Odour	Slight fragrant	Pungent
3.	Taste	Astringent	Bitter followed by Astringent
4.	Touch	Hard	Coarse

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

Sr. No	Parameters	Value	
		Khadirashtaka Ghanavati	***Khadirashtaka Kwatha***
1.	Loss on drying	12.95%	9.35% w/w
2.	Ash value	14.88%	8.15%w/w
3.	Water Soluble extract	35.15%	14.16%
4.	Alcohol Soluble extract	18.34%	10.72%
5.	pH (5% aqueous)	5.5	4.2
6.	Hardness	3.5 kg/cm2	-
7.	Disintegration time	30 minutes	-

Table 4: HPTLC Study of *Khadirashtaka Ghanavati* & *Khadirashtaka Kwatha*

Sr. No	Wavelength	Results			
		Khadirashtaka Ghanavati.		***Khadirashtaka Kwatha***	
		No. of spots	**R_f value**	**No. of spots**	**R_f value**
1.	254 nm	02	0.02,0.09	12	0.03,0.10,0.20,0.24,0.29,0.38, 0.49,0.53, 0.66, 0.77, 0.85,0.90
2.	366 nm	01	0.02	06	0.03,0.14,0.35,0.48,0.53,0.90

DISCUSSION

Pharmacognostical study helps in exact authentication of drugs through its organoleptic characters like taste, odor, color and touch along with microscopical characters and physico-chemical parameters. By authenticated Pharmacognostical study the misuse of drugs and adulteration can be prevented largely. Pharmacognostical evaluation of *Khadirashtaka Kwatha* & *Khadirashtaka Ghanavati* showed similar characters as shown in Plate 1 like presence of border pitted vessels of *Guduchi*, starch grains of *Guduchi*, rhomboidal crystal of *Khadira*, cystolith of *Vasa*, Crystal fibres of *Nimba*, Spiral vessels of *Patola*, Scleroids of *Haritaki & Vibhitaki*, silica deposition of *Amalaki*, collenchyma cells of *Guduchi*, wavy parenchyma cells of *Patola*, Prismatic crystal of *Nimba*, Epicarp cells of *Haritaki*, Cork with tannin content of *Khadira*. All the pharmaceutical parameters analyzed showed values permissible for *Kwatha* & *Ghanavati*. The physicochemical parameters of *Khadirashtaka Kwatha* show that the percentage of water soluble material is more than alcohol soluble extract. It also showed presence of acidic nature of drugs (pH- 4.2) which will be helpful to improve the *Jatharagni* (digestive fire). The Ash values of *Khadirashtaka Kwatha* provides an idea about the matter which is not organic or earthy in the drug. The phyto-chemical evaluation of *Khadirashtaka Kwatha* was done and it shows the presence of carbohydrates (starch), cork cell, fibers and silica. Thus it can be inferred that the drug may yield desired pharmacological action. HPTLC has done to identify the intensity of characters reside in the drugs and to determine the purity of drug. HPTLC showed that the active principles in *Khadirashtaka Kwatha* are more sensitive than *Khadirashtaka Ghanavati* for short UV radiation that is 254 nm and long UV radiation that is 366 nm as *Khadirashtaka Kwatha* had shown 12 spots at 254nm & 6 spots at 366nm while *Ghanavati* had shown 2 spots at 254 nm & 1 spot at 366 nm.

CONCLUSION

The microscopic pictures showed collenchyma cells, wavy parenchyma cells, prismatic crystal, epicarp cells, cork, fibers, border pitted vessel, silica deposition and simple starch grains, these all are the common characters of *Khadirashtaka Kwatha* and all the previously described physico chemical parameters for both *Kwatha* and *Ghanavati* are within permissible limits. As there have been many more studies on both the drugs till date, the findings of the study will definitely strengthen the previous one.

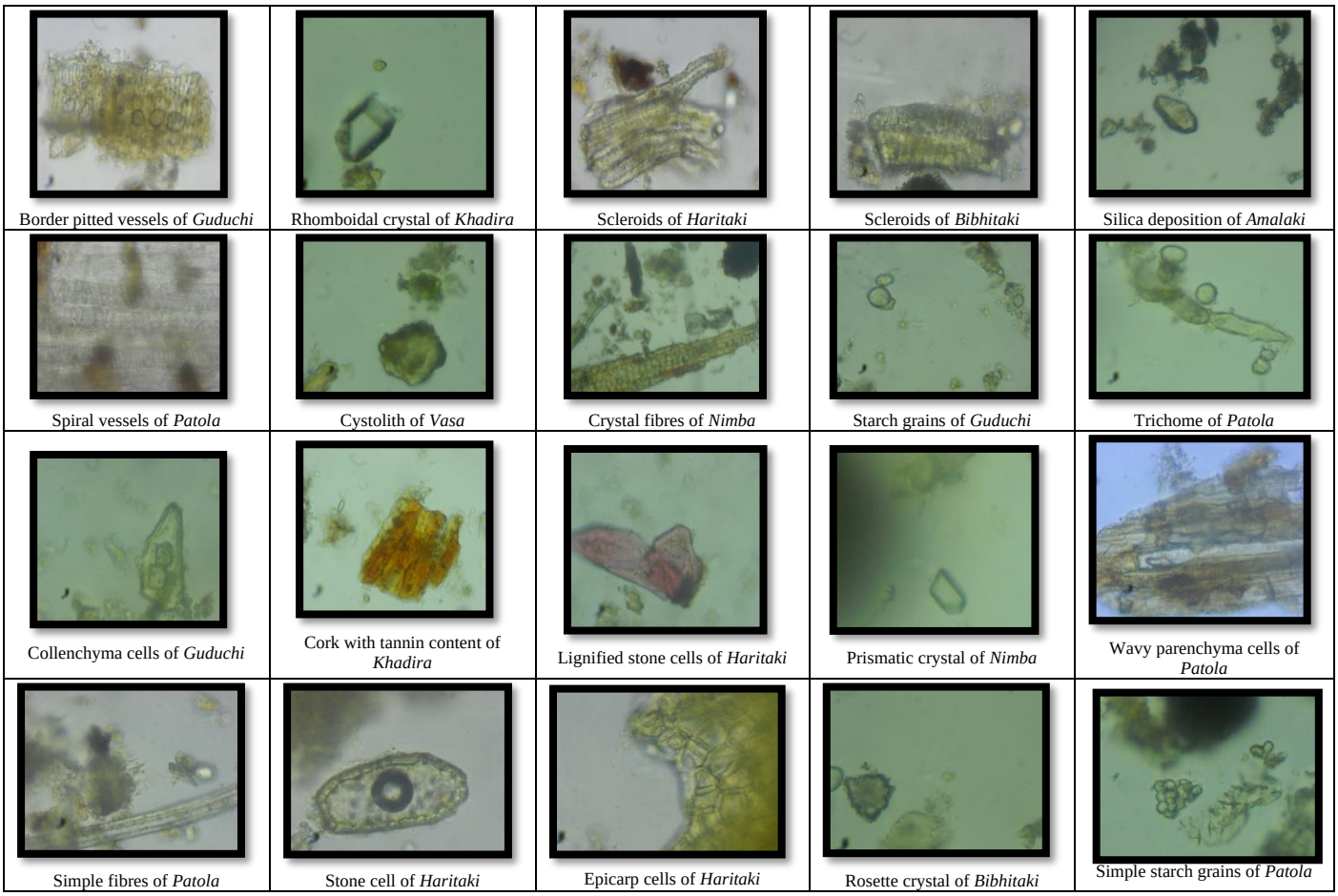
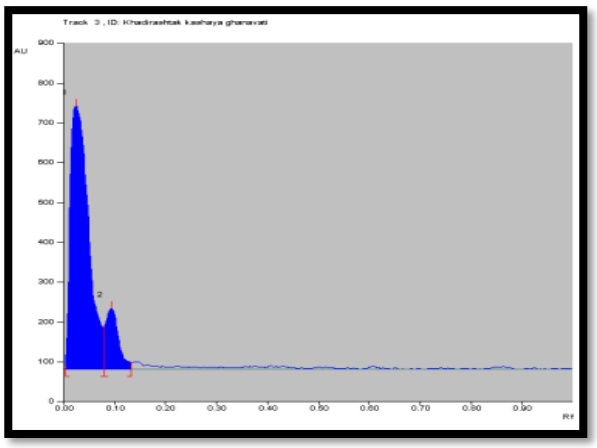
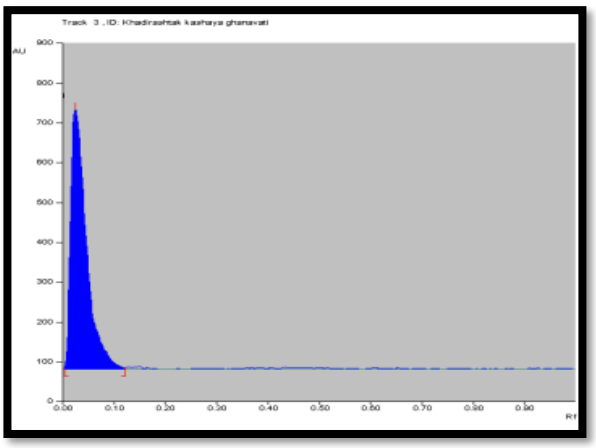


Plate 1: Microphotographs of *Khadirashtaka Kwatha*

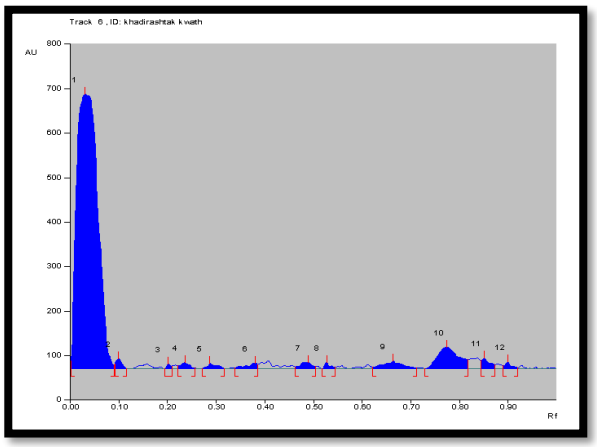


Peak display at 254nm

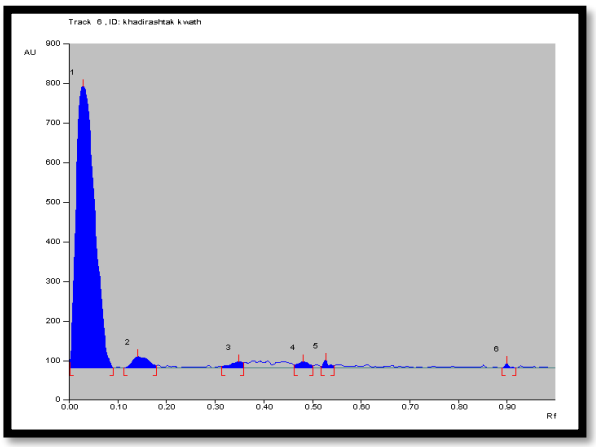


Peak display at 366nm

Plate 2: HPTLC of *Khadirashtaka Ghanavati*



Peak display at 254 nm



Peak display at 366 nm

Plate 3: HPTLC of *Khdirashtaka Kwatha*

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