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Research Article

A PHARMACEUTICAL STANDARDIZATION OF *GUDUCHI* (*TINOSPORA CORDIFOLIA*)

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ABSTRACT

Guduchi, scientifically known as *Tinospora cordifolia*, is a prominent herb in Ayurveda and traditional medicine systems. Its rich history of use for centuries, is owing to its composite therapeutic properties. This botanical has gained increasing attention in modern medicine due to its potential as an immunomodulatory, anti-inflammatory, antioxidant and adaptogenic agent. This abstract focuses on the standardization of *Guduchi* to ensure consistent quality and potency in herbal formulations. Standardization involves the quantification of key bioactive compounds, such as alkaloids, glycosides and polysaccharides, which contribute to its therapeutic effects. For the identification, purity and strength these must be fulfilled - analytical parameters like foreign matter, total ash value, acid insoluble ash, alcohol soluble extractive, water soluble extractive and moisture content in fresh drug. Overall, no adverse reactions or toxicity of *Guduchi* have been obtained. The present study was focused on analytical studies which was carried out separately on the basis of classically illustrated organoleptic tests, modern physio-chemical parameters like loss on drying at 110°C, ash value, acid insoluble ash, alcohol soluble extract, pH (10% aqueous solution), water soluble extractive in different parameters and microscopic study of *Guduchi* powder. Hence the present work may be used for the quality assessment and standardization of *Guduchi* (*Tinospora cordifolia*).

INTRODUCTION

Guduchi is considered as a divine herb owing to its multifaceted health benefits. In Hindu mythology, it is believed to have been originated from nectar (*Amrita*). A myth about the origin of *Guduchi* is that during the war between Lord Rama and Ravana, when the army of monkeys started dying Lord Indra dispensed *Amrit* among them. While distributing *Amrit,* some of its drops fell on the ground and *Guduchi* plant originated from that (B.P.N). Hence, to ensure long and healthy life, our ancestors advised to plant *Guduchi* sapling in everyone's house. Ayurveda classics have praised this versatile herb since ages. *Charak Samhita* considered *Guduchi* as the best *Sangrahi, Vatahara, Deepaniya, Shlesm-shonita vibandh shamak dravya* (CSS. 25/40) and described it as one of the *Medhya rasayana* (C.S. CI. 1/3/30). In *Sushrut Samhita* it is mentioned in *Tikta patra shaka varga* under the name of *Vatsadini,* while in *Ashtang Hridaya* it is considered as the best drug for the treatment of *Vatarakta* (A.H.U. 40/59), *Sharangdhar Samhita* recommended the use of *Guduchi* in fresh state (Sh.S. 1/1/45-47). *Guduchi* is included in the group of panchtikta (Rasatarangani 2/18), Vallipanchmool (S.S.Su. 38/72), and Chatubhadra (R.N. Mishrakadi/17)

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Synonyms [1]

Guduchi is also known as *Amrita, Amritvallari, Bhishakpriya, Chakralakshanika, Chandrahasa, Chinnarooha, Devnirmita, Jwarnashini* etc.

Rasapanchaka[2]

Guna - Laghu, Snigdha
Rasa - Tikta, Katu, Kasaya
Vipaka - Madhura
Virya - Ushna
Prabhava - Tridoshahara

Chemical Constituents [3,4]

The stem is rich in sesquiterpene, tinocordifolin, alkaloids, berberine, choline, magnoflorine, palmatine, tembetarine, tinosporin, glycosides,lactone and steroids (sitosterols, hydroxy ecdysone, makisterone etc), jatrorrhizine, tinosporidine, cordifol, cordifelone, giloin, giloinin, and tinosporic acid (Khatun et al 2016; Promila et al 2017).

Standardization of *Guduchi- Tinospora cordifolia* (Stem) [5]

Physicochemical Parameters

S.No	Test parameters	Result (in %w/w)
1.	Loss on drying	7.13
2.	Ash value	8.5
3.	Acid insoluble ash	1.7
4.	Water soluble ext	13.7
5.	Alcohol soluble ext	12.3
6.	pH (10% Aq. Solution)	4.74

Phytochemical Parameters

S.No	Phytochemical compounds	Result
1.	Alkaloids	+
2.	Carbohydrates	-
3.	Flavonoids	+
4.	Saponins	+
5.	Steroids	+
6.	Tannins	+
7.	Starch	+
8.	Acid Test	-

High Performance Thin Layer Chromatography (HPTLC) Profile [*Guduchi* (*Tinospora cordifolia)* (Stem)]

Sample Preparation

1gm of the sample was subjected to reflux with Methanol, for 1 hour and extract was filtered using Whatmann-1, filter paper. The filtrate was concentrated and taken for the following HPTLC profile.

Chromatography Experimental

Stationary Phase

Pre-coated (support on aluminium sheets) silica gel plate. Specification: TLC Silica Gel $60F_{254}$, Mfg. by Merck.

Mobile Phase

Hexane: Ethyl acetate: Methanol (5:3:2, v/v) [G R grade solvent used]

Sample Application

Variable volumes applied as 4µL and 5µL in track 1 and track 2 respectively, as 8mm band and at 15mm from the base of the plate.

Development

Developed up to 80mm in CAMAG Twin trough chamber, Plate preconditioning (temp 25°C and relative average humidity was 42%)

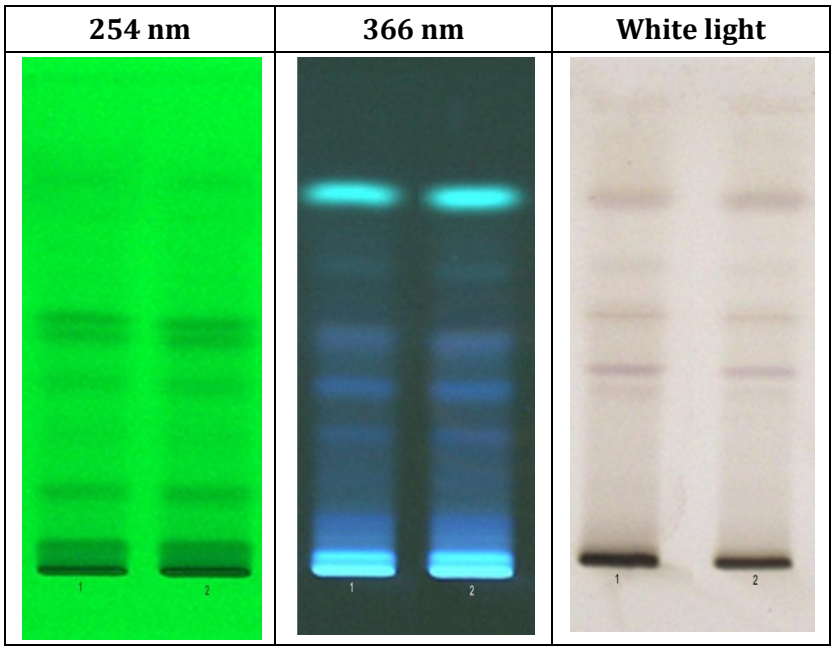
Visualization

Images of the developed plate were captured under 254nm, 366nm UV light.

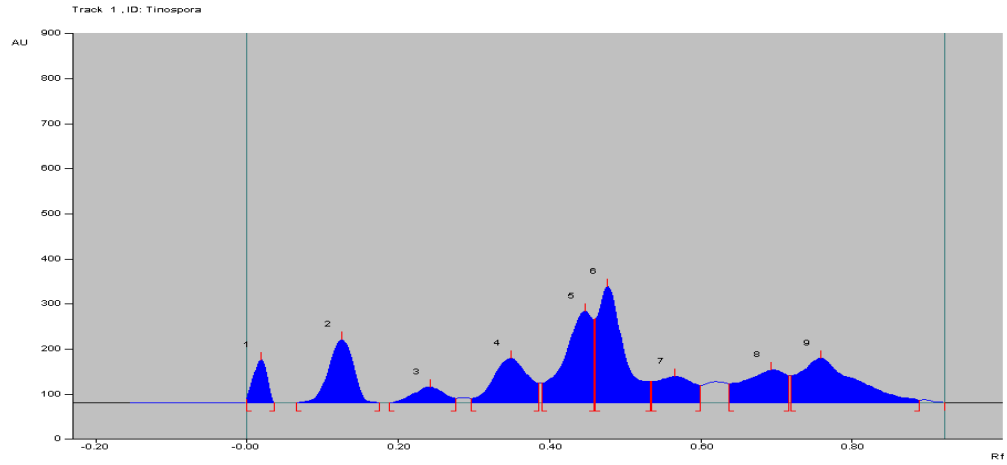
Derivatisation

Developed plate was dipped in 20% aq. sulphuric acid and charred at 105°C and visualized at white light.

Photography of HPTLC Plate



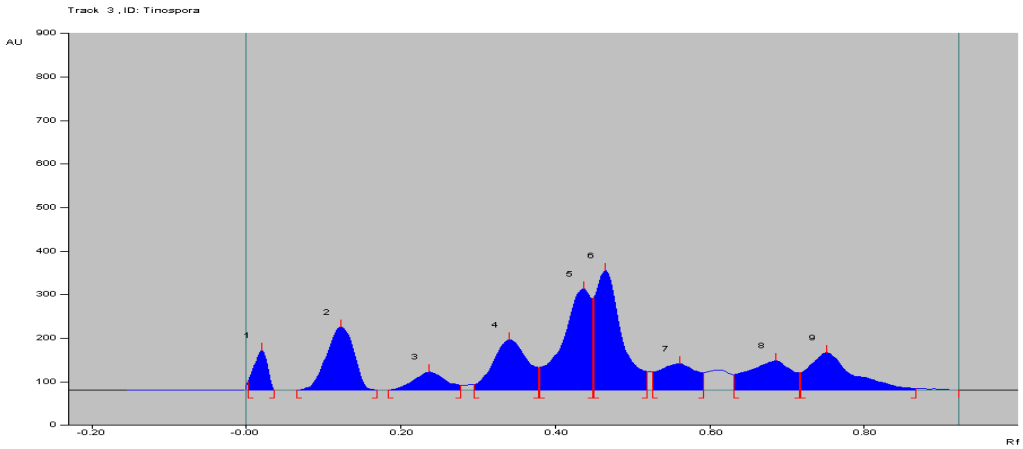
HPTLC fingerprint at 254nm



R_f Values

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.00 Rf	7.9 AU	0.02 Rf	95.7 AU	9.02 %	0.04 Rf	0.1 AU	282.8 AU	3.99 %
2	0.07 Rf	0.0 AU	0.13 Rf	40.3 AU	3.24 %	0.18 Rf	0.0 AU	381.2 AU	0.52 %
3	0.19 Rf	0.0 AU	0.24 Rf	34.9 AU	3.29 %	0.28 Rf	9.9 AU	078.8 AU	3.36 %
4	0.30 Rf	9.7 AU	0.35 Rf	99.0 AU	9.33 %	0.39 Rf	3.8 AU	391.6 AU	0.55 %
5	0.39 Rf	43.8 AU	0.45 Rf	03.3 AU	9.17 %	0.46 Rf	4.7 AU	709.4 AU	7.76 %
6	0.46 Rf	86.0 AU	0.48 Rf	57.7 AU	4.30 %	0.53 Rf	3.8 AU	591.5 AU	0.51 %
7	0.54 Rf	46.8 AU	0.57 Rf	58.5 AU	5.51 %	0.60 Rf	3.6 AU	173.3 AU	6.76 %
8	0.64 Rf	42.2 AU	0.69 Rf	72.5 AU	6.84 %	0.72 Rf	0.9 AU	055.4 AU	9.51 %
9	0.72 Rf	60.9 AU	0.76 Rf	98.5 AU	9.29 %	0.89 Rf	5.5 AU	479.7 AU	7.05 %

Track 1



R_f Values

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.00 Rf	20.4 AU	0.02 Rf	91.1 AU	8.18 %	0.04 Rf	0.3 AU	174.7 AU	3.67 %
2	0.07 Rf	0.0 AU	0.12 Rf	44.5 AU	2.98 %	0.17 Rf	0.0 AU	772.2 AU	1.79 %
3	0.18 Rf	0.1 AU	0.24 Rf	41.3 AU	3.71 %	0.28 Rf	1.5 AU	285.3 AU	4.02 %
4	0.30 Rf	13.5 AU	0.34 Rf	15.4 AU	0.37 %	0.38 Rf	2.1 AU	825.9 AU	1.95 %
5	0.38 Rf	52.3 AU	0.44 Rf	32.9 AU	0.93 %	0.45 Rf	9.9 AU	446.6 AU	0.14 %
6	0.45 Rf	11.7 AU	0.46 Rf	73.6 AU	4.58 %	0.52 Rf	2.9 AU	806.1 AU	1.27 %
7	0.53 Rf	41.8 AU	0.56 Rf	61.0 AU	5.48 %	0.59 Rf	9.6 AU	215.6 AU	6.92 %
8	0.63 Rf	35.4 AU	0.69 Rf	67.4 AU	6.05 %	0.72 Rf	9.5 AU	848.0 AU	8.90 %
9	0.72 Rf	39.7 AU	0.75 Rf	85.7 AU	7.71 %	0.87 Rf	3.4 AU	630.7 AU	1.34 %

Track 2

Guduchi

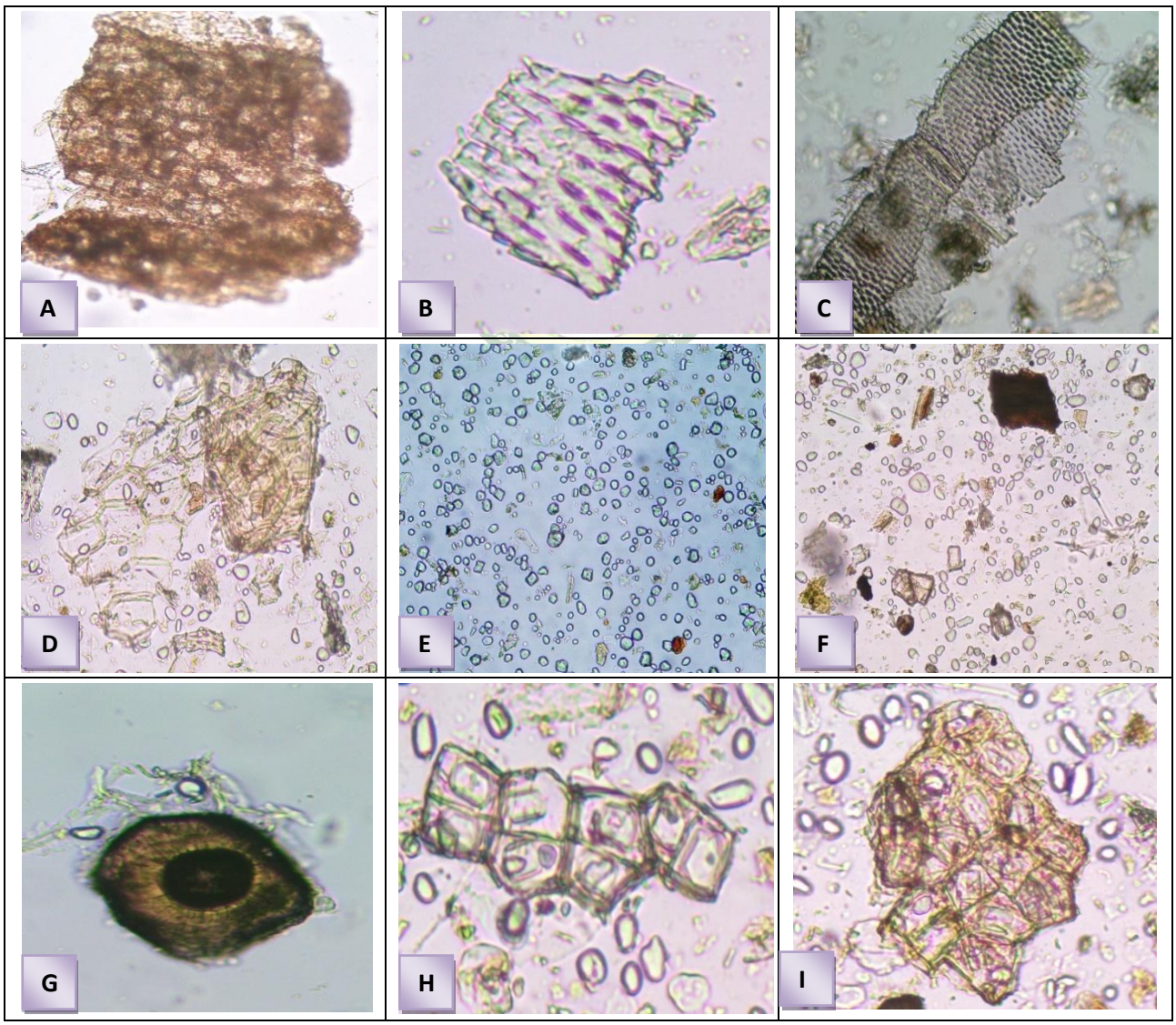
Organoleptic study of Powder

Colour: Creamish brown
Texture: Fine and smooth
Odour: Not characteristic
Taste: Bitter

Macroscopy of *Guduchi* powder

Powder Microscopy: Powder shows presence of profuse starch grains, lignified stone cells are in single or in groups; groups of polygonal thick brown walled striated cork cells, groups of oval to polygonal parenchyma cells with prismatic crystals and pitted xylem vessels.

Powder Microscopy



Powder microscopy of *Guduchi*

A. Polygonal cork cells; B., C. Pitted vessels; D. Parenchymatous cells with starch grains; E.F., Simple starch grains with hila; G., H. Stone cells; I. Parenchymatous cells with prismatic crystals

Identification, Purity [6]

In *Guduchi* foreign matter must not be more than 2%, total ash not more than 16%, acid-insoluble ash not more than 3%, alcohol-soluble extractive not less than 3%, water-soluble extractive not less than 11%, moisture content (in fresh drug) not less than 75% (Source: The Ayurvedic Pharmacopeia of India 1989).

CONCLUSION

The physicochemical parameters of the samples were analyzed. It was found that some of the parameters were like loss of drying 7.13, water soluble ext 13.7, alcohol soluble ext 4.74, pH 4.74. Whereas in phytochemical parameters alkaloids, flavonoids, saponins, steroids, tannins, starch present in *Guduchi churna*. In powder microscopic investigation, Powder (*Guduchi*) shows presence of profuse starch grains, lignified stone cells are in sample. On the basis of these parameters, bioavailability of the drug will be increased and thus quick action is expected. It is the drug of choice in treatment of *Vatarakta, Jwar, Amlapitta, Kamala, Daha, Prameha, Vayahsthapana* etc. Until now, there are no adverse reactions, toxicity reported.

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