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PHARMACOGNOSTICAL AND PHARMACEUTICAL ANALYSIS OF GUDUCHYADI GHRITA-AN AYURVEDIC HERBAL FORMULATION FOR MILD NEUROCOGNITIVE DISORDER

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ABSTRACT

Background: Mild neurocognitive disorder is a transitional phase between normal cognitive aging and dementia, marked by modest decline in cognitive functions. This underscores the critical need for early identification and effective management strategies aimed at secondary prevention. So, the polyherbal formulation *Guduchyadi Ghrita* was used for the clinical trial for the management of mild neurocognitive disorder. Therefore, for the assurance of quality of herbal compounds pharmacognostical and pharmaceutical analysis has been done. **Methods:** *Guduchyadi Ghrita* was subjected to pharmacognostical, and physiochemical analysis like loss on drying, acid insoluble extract, specific gravity, saponification, iodine value and thin layer chromatography (TLC). **Results:** Pharmacognostical study showed the presence of certain identifying characters of the ingredients of *Guduchyadi Ghrita*. In pharmaceutical study, preliminary physiochemical analysis showed loss on drying 0.39% w/w, specific gravity 0.917 w/w, acid value 7.119 w/w, saponification 226 w/w, iodine value 40.665 w/w and TLC showed 2 spots in 254 nm and 2 spots in 366 nm. **Conclusions:** The Pharmacognostical and physico-chemical study of *Guduchyadi Ghrita* follows the standard parameters. This study can be

helpful for further research regarding establishment of therapeutic efficacy of *Ghrita* formulations.

KEYWORDS: *Guduchyadi Ghrita*, Mild neurocognitive disorder, Pharmacognostical, Pharmaceutical analysis.

INTRODUCTION

Mild neurocognitive disorder is a transitional phase between normal cognitive aging and dementia, marked by modest decline in cognitive functions.[1] This underscores the critical need for early identification and effective management strategies aimed at secondary prevention. So, the polyherbal formulation *Guduchyadi Ghrita* has been used for the clinical trial for the management of mild neurocognitive disorder. Therefore, for the assurance of quality of herbal compounds pharmacognostical and pharmaceutical analysis has been done. For the internal administration of herbal drugs, it is essential that they are safe, effective, and free from adulteration, with appropriate quantities and ingredients. Identifying herbal drugs in dry or powdered form can be challenging, highlighting the need for proper standardization parameters. Pharmacognostical studies facilitate plant identification and establish standardization parameters for herbal traditional medicine. Furthermore, physiochemical analytical studies help interpret the pharmacokinetics and pharmacodynamics involved in these drugs. Through these studies, it is possible to standardize herbal medications and differentiate them from adulterants. Conventional methods such as high-performance thin-layer chromatography (HPTLC) and thin-layer chromatography (TLC) are commonly used to analyze secondary metabolites derived from plants. In Ayurveda, it is crucial to implement quality control measures for both raw materials and final products. This approach not only enhances the credibility of *Ayurvedic* medicines but also supports their globalization. Consequently, the present study was conducted to evaluate the authenticity of *Guduchyadi Ghrita* through various pharmacognostical procedures and to develop a pharmacognostical and phytochemical profile of this formulation.

Collection, Identification and Authentication of raw drugs

All the raw material for the drug under the trial were procured from the pharmacy of I.T.R.A. Jamnagar and those that were not available in the pharmacy were procured from the authentic source and the raw drugs were identified and authenticated in the pharmacognosy laboratory of Institute for Teaching and Research in Ayurveda, Jamnagar. The ingredients of the *Guduchyadi Ghrita* are given in the Table 1.

Table 1: Ingredients of the *Guduchyadi Ghrita*.

S. N.	Drug	Botanical Name	Family	Parts used	Proportion
1.	*Guduchi*	*Tinospora cordifolia (Willd)* Miers ex Hook. f. &Thomas.	Menispermaceae	Stem	Equal quantity of each drug was taken for the preparation of *Kalka* and *Drava Dravyas*. *Kalka, Sneha and Drava Dravays* were taken in the ratio of 1:4:16.
2.	*Ashwagandha*	*Withanina somnoifera* Linn.	Solanaceae	Root	
3.	*Brahmi*	*Bacopa monneri* Linn.	Scrophulariaceae	Whole plant *(Panchanga)*	
4.	*Shankhapushpi*	*Convolvulus pluricaulis* Chois.	Convolvulaceae	Whole plant *(Panchanga*)	
5.	*Punarnava*	*Boerhavia diffusa* Linn.	Nyctaginaceae	Whole plant (*Panchanga)*	
6.	*Go Ghrita*	Cow Ghee	-	-	

Preparation of drug

Guduchyadi Ghrita was prepared by the classical *Snehapaka Vidhi* in the pharmacy of I.T. R.A., Jamnagar. For the preparation of the *Guduchyadi Ghrita*, *Kalka*, *Ghrita* and *Drava Dravays* (*Kwatha* of *Shankhapushpi*, and *Punarnava* & *Swarasa* of *Guduchi*, *Ashwagandha*, and *Brahmi)* were taken in the ratio of 1:4:16. During the preparation of the *Guduchyadi Ghrita*, *Sneha* required for *Nasya* was taken once *Mridu Snehapaka Lakshana* was obtained, and the rest was further heated till *Madhyam Paka Lakshana* was attained and was utilised for *Pana* (oral intake).

Pharmacognostical study

The pharmacognostical study of the trial drug *Guduchyadi Ghrita* was done in two steps i.e. organoleptic study and powder microscopy.

Organoleptic study

Organoleptic evaluation is done by sense organs which provide simplest and quickest means to establish the identity of a particular drug. The raw drugs and its powder were separately evaluated by organoleptic characters like colour, odour, taste and touch.[2] Organoleptic parameters of the sample was scientifically studied as per the standard references.

Powder microscopy

Powder of the drugs was studied microscopically. The powder of the drug was dissolved with water followed by microscopy of the sample without stain and after staining with Phloroglucinol + HCl. Microphotographs of the sample were also taken under Corl-zeiss trinocular microscope.[3]

Physico- chemical analysis

With the help of various standard physico-chemical parameters, *Guduchyadi Ghrita* was analysed. The common parameters mentioned for *Ghrita* (*Sneha*) *Kalpana* in Ayurvedic Pharmacopeia of India, and CCRAS, guidelines are loss on drying, specific gravity, acid value, saponification and iodine value.

Thin layer chromatography

Thin layer chromatography (TLC) is a quick, sensitive, and inexpensive technique used to determine the number of components in a mixture, verify the identity and purity of a compound, monitor the progress of a reaction, determine the solvent composition for preparative separations, and analyze the fractions obtained from column chromatography. [4]

RESULTS

The initial purpose of the study was to confirm the authenticity of the drugs used in preparation of *Guduchyadi Ghrita*. For this, coarse powder of ingredients was subjected to organoleptic and microscopic evaluations to confirm the genuineness of the raw drugs. Later, after the preparation of formulation, pharmacognostical evaluation was carried out.

Organoleptic evaluation

Organoleptic features like colour, odour & taste of the *Guduchyadi Ghrita* were recorded and are placed in Table 2.

Table 2: Organoleptic characters of *guduchyadi ghrita.*

1	Color	Green
2	Odor	Characteristic
3	Taste	Bitter
4	Touch	Oily, viscus

Microscopic evaluation

Microscopic evaluation was conducted by dissolving powder of *Guduchi, Ashwagandha, Brahmi, Punarnava and Sankhapusphi* in the distilled water and were studied under microscope for the presence of characteristics of ingredient drugs.

The diagnostic characters of the ingredients of *Guduchyadi Ghrita* i.e. *Guduchi, Sankhapusphi, Ashwagandha, Punarnava* and *Brahmi* are as per the details mentioned in the table 3,4,5,6 and 7 respectively.

Table 3: Microscopic Characters of *Guduchi*.

a. Collenchyma cells	e. Simple and compound starch grains with parenchyma cells
b. Pitted vessels	f. Simple and compound starch grains
C Collenchyma Lignified of *Guduchi*	g. Simple starch with hilum-concentric lines
d. Prismatic Crystals	

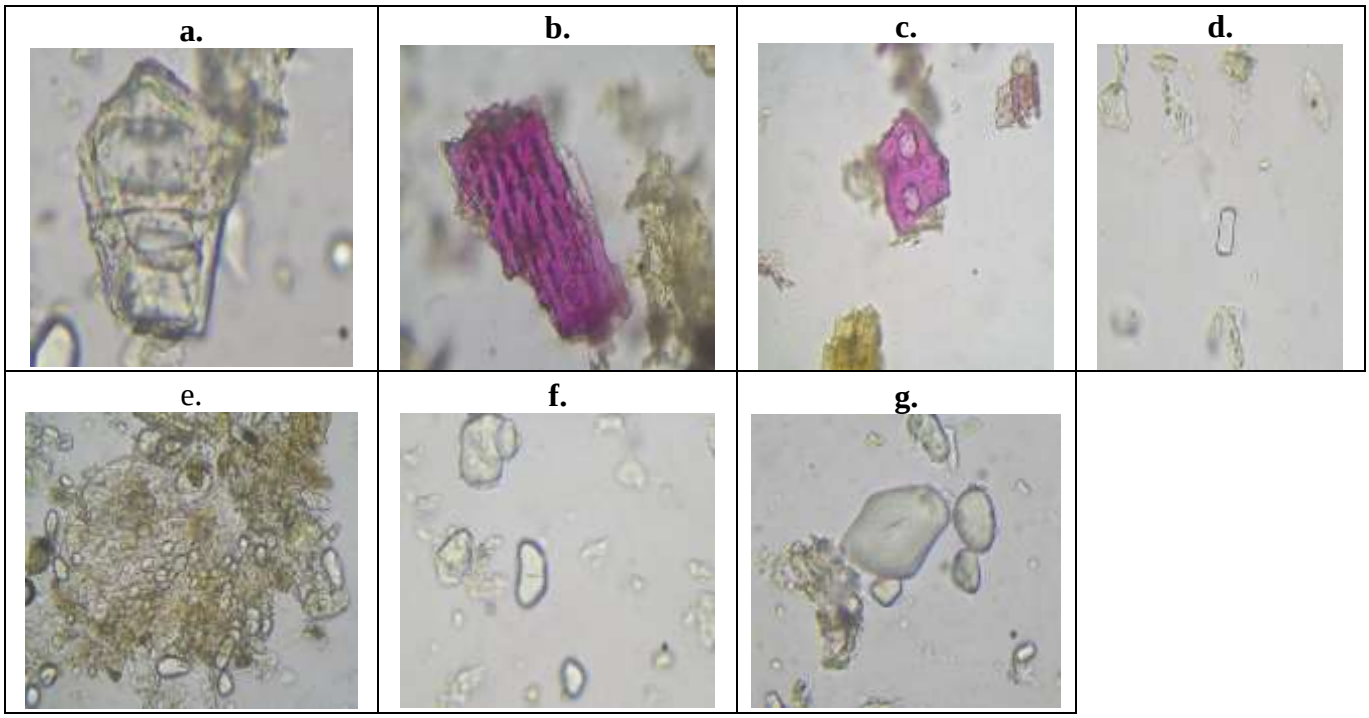


Table 4: Microscopic characters of *sankhapusphi.*

a. Epidermal cells with stomata	d. SFP pollen grains
b. SCPS lignified septate fibre	e. SFP simple starch grain
c. SCPS lignified Trichome	f. Simple fibres

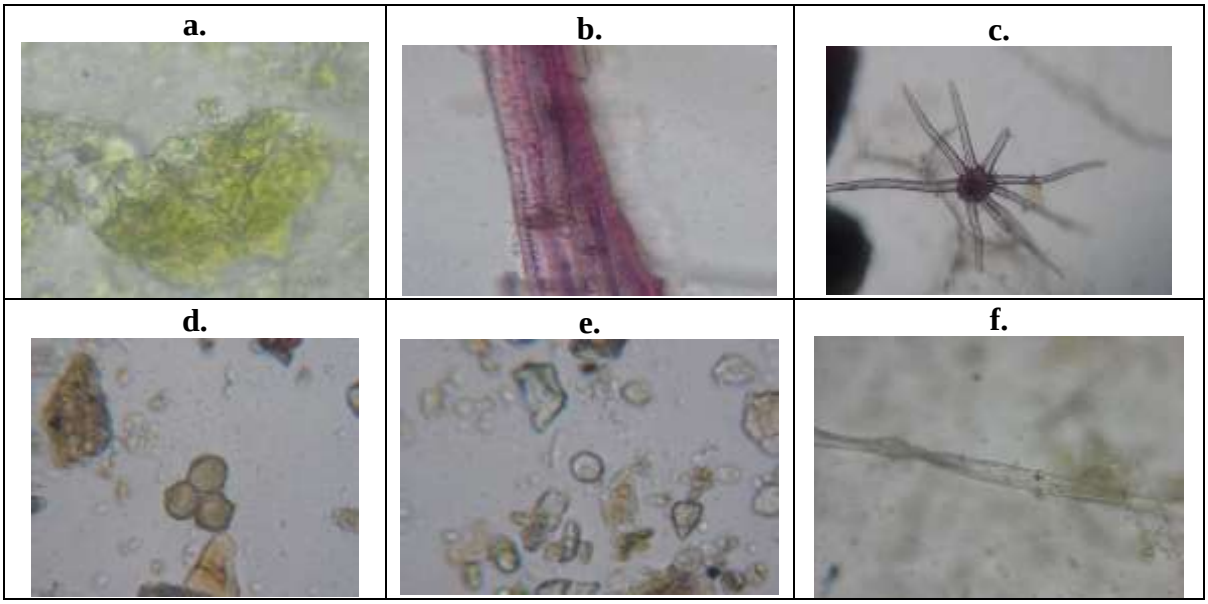


Table 5: Microscopic characters of *ashwagandha.*

a. Cork in surface view	d. Parenchyma cells filled with starch grains
b. Fragment of pitted vessel	e. Prismatic crystals of Calcium oxalate
c. Lignified fibers after staining	f. Simple and compound starch grains with hilum

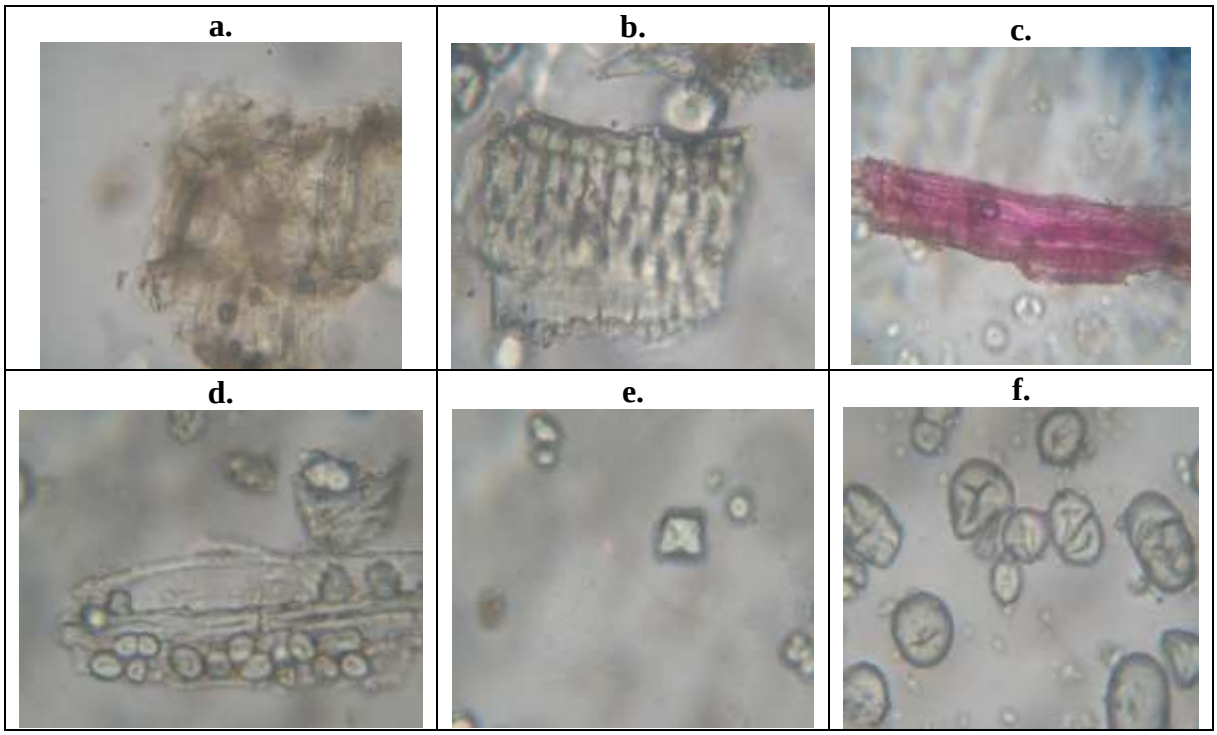


Table 6: Microscopic characters of *punarnava.*

a. Acicular crystals of Punarnava	b. Crystals with starch grains
c. Cork cells of Punarnava	d. Simple and compound starch grains of Punarnava

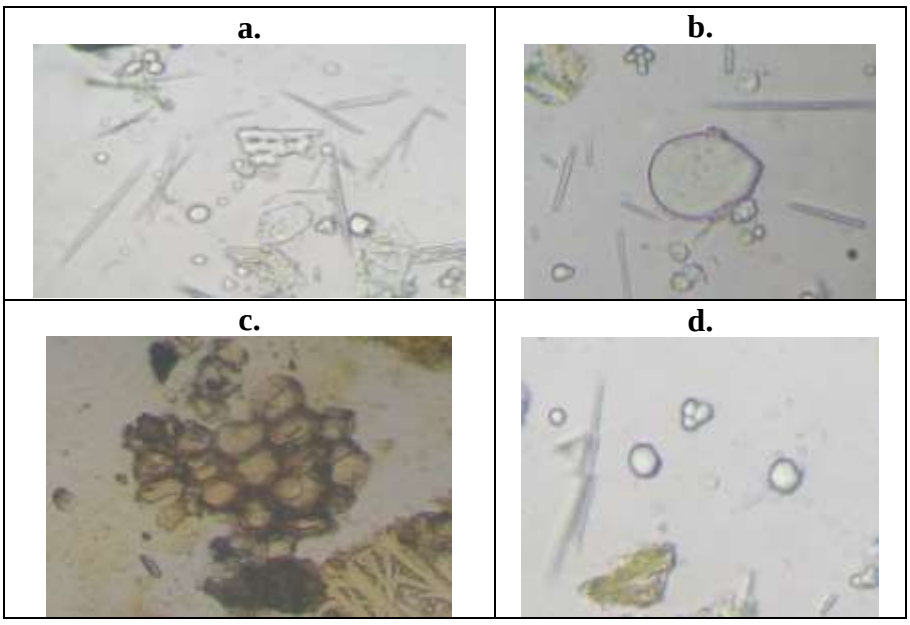
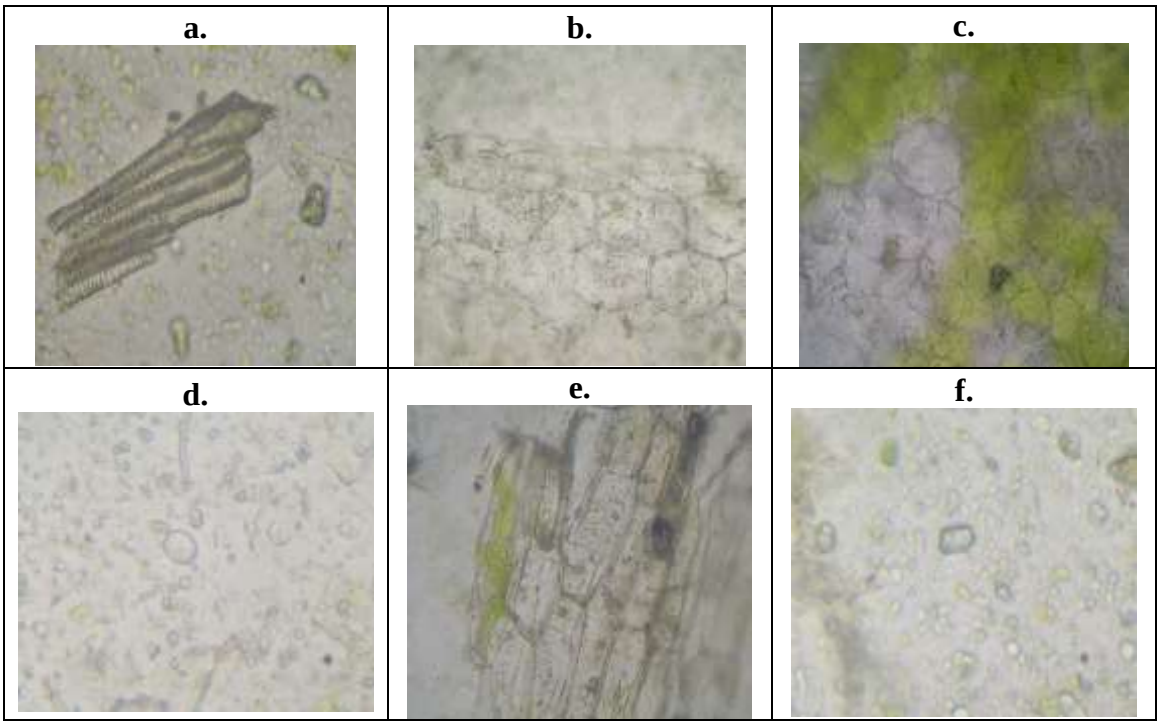


Table 7: Microscopic characters of *brahmi.*

a. Annular and spiral vessels	d. Oil globules and starch grains
b. Epidermal cells	e. Pallisade parenchyma cells
c. Fragment of spongy parenchyma cells	d. Prismatic crystal



Physio-chemical parameters

Physio-chemical parameters like loss on drying, specific gravity, acid value, saponification & iodine values were found within the normal range. Details is shown in the Table 8.

Table 8: Physico-Chemical analysis of *Guduchyadi Ghrita.*

S.N.	Parameters	*Guduchyadi Ghrita*
1	Loss on drying	0.39%
2	Acid value	7.119 W/W
3	Specific gravity	0.917 W/W
4	Iodine value	40.665 W/W
5	Saponification value	226 W/W

Thin layer chromatography

Thin layer chromatography of the trial drug showed 2 spots at corresponding Rf values 0.175, and 0.137 in short wave UV 254 nm and 2 spots at corresponding Rf values 0.2375 and 0.137 obtained in long wave UV 366 nm (Table 9). Though it is not possible to identify particular chemical constituent from the spot obtained, the pattern may be used as a reference standard for further quality control researches.

Table 9: Rf Values of *Guduchyadi Ghrita.*

Extract	Solvent system	Wave length	No of spots	Reference value
Unsaponified matter of ghee	Toluene: Ethyl acetate: Methanol: Formic acid (6:3:1:0.1)	254 nm	2	0.175,0.137
		366 nm	2	0.2375, 0.137

DISCUSSION

Study on *Guduchyadi Ghrita* was a step towards pharmacognostical and pharmaceutical standardization of the drug. The ingredients of the *Guduchyadi Ghrita* were identified and authenticated pharmacognostically. The formulation subjected to pharmacognostical study revealed genuineness of the preparation as the microscopical characters of all the ingredients were observed in the finished products of the formulation too and no major change in the microscopic structure of raw drug during the pharmaceutical process of preparation of *Ghrita* showed the genuinity of the final product. The results revealed that *Guduchyadi Ghrita* is free from unwanted organic compounds and production site was good enough keeping sample free from dust and other solid matters. And an attempt has been made to find out the physico-chemical profiles of *Guduchyadi Ghrita*. All the physio-chemical parameters, Specific gravity- 0.917 W/W, acid value-7.119, saponification - 226, iodine value-40.665 were analysed were within normal referential range. In TLC study 2 spots at 254 nm and 2 spots at 366 nm were obtained, indicating its possible components of matrix which may possess its therapeutic effect.

CONCLUSION

The pharmacognostical and physico chemical analysis of *Guduchyadi Ghrita* confirmed the purity and genuinity of the drug. As no standard fingerprint is available for this formulation, an attempt has been made to evolve pharmacognostical and physico-chemical profiles of *Guduchyadi Ghrita*. Information acquired from this study may be beneficial for further research work and can be used as a reference standard for quality control researches.

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