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PHARMACOGNOSTICAL AND PHYTOCHEMICAL EVALUATION OF GOKSHURADI GUGGULU - AN AYURVEDIC POLYHERBAL FORMULATION

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ABSTRACT

Gokshuradi Guggulu a polyherbal Ayurvedic formulation is recommended in the management of *Madhumeha*. There has been an increase in demand for the Phyto-pharmaceutical products of *Ayurveda* so a pharmaceutical preparation in the form of *Gokshuradi Guggulu* was tried to standardize, which is economical in terms of time and machinery usage. Till date there is no reference regarding evaluation of *Gokshuradi Guggulu*.In the present study *Gokshuradi Guggulu* subjected to confirm its quality and purity, Pharmacognostical and phyto-chemically. Results revealed the specific characters ie. Silica deposition, Tanin content, Starch grains, Prismatic crystals, Oleo resins, Scleroid along with fibres, Black debris. Physicochemical results showed that pH 5.0, Water soluble extract 29.6% w/w, support the intended action of the formulation in Diabetic polyneuropathy.

Keywords: *Gokshuradi Guggulu*, *Madhumeha*, Pharmacognosy, Phyto-chemistry.

INTRODUCTION

Ayurveda is the oldest holistic management system with meticulously documented medicines and being practiced by a large population in India and abroad. The development of this traditional system of medicines with perspectives of safety, efficacy and quality will help not only to preserve the traditional heritage but also to rationalize the use of natural products in health care [1-2]. Diabetic Mellitus (DM) is a most widespread disease in existence. As the civilization developed, lifestyle disorders evolved as a negative effect. Diabetes has got a prime place among them according to WHO, an estimated 285 million people of world's adult population, live with Diabetes Mellitus till 2010, The number is expected to be 438 million by 2030 [3]. In India alone, the prevalence of diabetes is expected to increase from 31.7 million in 2000 to 79.4 million in 2030 [4]. WHO has declared India as the "Diabetic capital of the World [5].

The American Academy of Family Physicians (AAFP) reports that this is characterized by Distal, bilateral, symmetrical, loss of sensation in a "stocking – glove" pattern, affecting the longest nerves first, starting with toes and feet, and spreading towards the trunk, It usually presents with sensory symptoms, which range from numbness("deadness") to severe pain. Burning, alterations of temperature sensation, parathiasias, and shooting, or stabbing pains are common. Pain may worsen especially at night. And in other hand, it decreases the quality of life of the patients [6]. These conditions are thought to result from diabetic micro vascular injury involving small blood vessels that supply nerves (Vasanervorum) in addition to the macro vascular complication that can culminate in DPN. All these are the result of metabolic derangements contributing to Hyperglycaemia, which in turn causes increased production of superoxide, as a result of oxidative stress. Due to excessive production superoxide, the enzymes like superoxide dismutase etc., fail to neutralize.

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Thus their excess accumulation, contribute to neuronal ischemia by activating the four major pathways of hyperglycaemic damage.

The direct comparison of Diabetic neuropathy is not available in Ayurvedic texts. On review of previous research works, many scholars have coined this disease by various names such as *Madhumeha Janya Upadrava, Twakgata Vata, Jhinjhinivata, Vatanadi Pradhana Shotha* etc., The explanation of symptoms are scattered in the *Purvarupa* and *Upadravas* of *Madhumeha*.

In *Prameha*, the manifestation of the disease to a mild or severe form is dependant mainly on the degree of *Doshadushya Sammurchana* by the *Nidana* [7] *Madhumeha*, is one of the *Vataja pramaeha*, which involves three *Doshas* and *Dash Dushyas*, where Chakrapani explains the involvement of all these *Dushyas* are seen from the initial stage of *Samprapti* itself [8]. As the disease progresses the involvement of *Dushyas* like *Majja* gets evident to a greater extent. The excess of *Meda* involvement in the very pathogenesis attributed to the excess increase of *Bahudrava Kapha* in *Madhumeaha* due to *Gunasadharmyata* [9] and thereby excess *Abaddhameda. Abaddhameda* results in *medodhatwagnimandya*, which in turn leads to *uttarottaradhatukshaya* [10], ie., affecting the formation of *majjadhatu.* As a result, further *Vataprakopa*, due to excessive *Dhatukshaya*, which initiates the nerve injury.

DM is caused by spectrum of diverse etiologies resulting in Chronic Hyperglycemia and complication attribute to it. Principally this is a metabolic disorder with variable clinical manifestation and progression, majority of the cases are detected after the manifestation of complications. The present study is planned to segregate the pathology of this malady by the drugs, which *possesses pramehaghna, kaphamedahara, srotoshodhana* and *Rasayana* property. *Gokshuradi Guggulu* [11]. Hence, for the first time reporting on the evaluation of *Gokshuradi Guggulu*, based on organoleptic, microscopic, physico-chemical, phytochemical parameters and HPTLC study.

MATERIAL AND METHODS

Collection of the drug

Gokshuradi Guggulu ingredients have been collected from the Pharmacy, I.P.G.T. & R. A., G.A.U., Jamnagar.The ingredients and the part used are given in (Table no.1)

Pharmacognostical Evaluation

As per API [12] raw drugs were identified and authenticated by the Pharmacognosy Lab. The identification was carried out based on the organoleptic features and powder microscopy of the individual drugs. Later, pharmacognostical evaluation of *Gokshuradi Guggulu* was carried out. *Vatak* dissolved in small quantity of distilled water, studied under the Carl zeisstrinocular microscope attached with camera, with stain and without stain. The microphotographs were also taken under the microscope.

Preparation of *Gokshuradi Guggulu*

Gokshuradi Guggulu was prepared in the Pharmacy of Rasashastra dept I.P.G.T. & R.A GAU, Jamnagar.

Method of Preparation

The kwatha prepared out of 28 palas of Gokshura and 6 times of Jala, according to KwathanirmanVidhi, 7 Palas of Guggulu was mixed with the Kwatha and subjected to Agni till the appearance of Gudapakalakshanas. Afterwards, mix 7 Palaschurna of Triphala, Trikatu and Musta (one Pala each ingredient) be mixed well and Vati prepared of the size of one Shana matra.

Weight of each V*ati, a*bout 500 gm. Shape: Round shape Size: About 0.5 cm, greyish dark in colour with specific odour, Hard to touch. Storage: kept in well closed polythe ne bags. Ingredients of *Gokshuradi Guggulu* are as shown in (Table no. 1) This *Vati* was analyzed using v arious standard physicochemical parameters such as, Loss on drying [13], PH, [14] water soluble extract, [15] and methanol soluble extract [16] as per API at the pharmaceutical chemistry lab, IPGT & RA.

OBSERVATION & RESULTS

Organoleptic parameters

Organoleptic parameters like Taste, Colour, odour and touch were scientifically studied and results were depicted in the table. (Table 2) *Gokshuradi Guggulu* subjected to pharmacognostical evaluation was carried out microscopical characters showed that the presence of tannin, fibers, sclerides, oleo resin content of Shunti, rhmboidal crystals and prismatic crystal of Gokshura, tannin content, stone and epicarp cells of Haritaki, unicellular blunt trichome of Bibhitaki, Tanin content of Musta (Photo Plate 1).

Physico-Chemical Parameters

Physico-Chemical parameters of the *Shilajatuvatak* like PH, Loss on drying, water soluble extract, and methanol soluble extract were all found to be within the normal range. (Table.3)

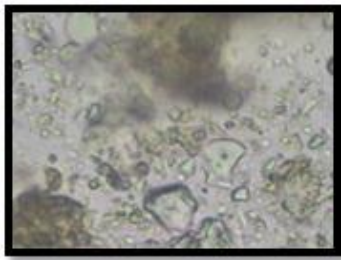
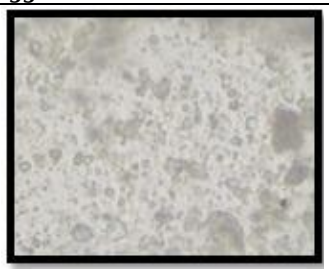
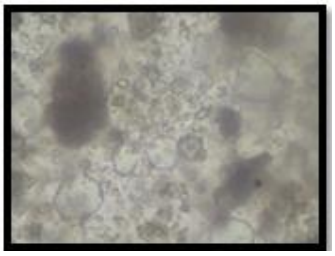
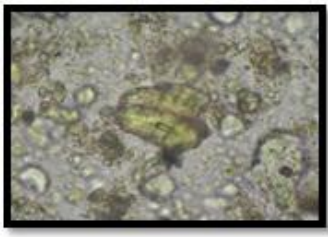
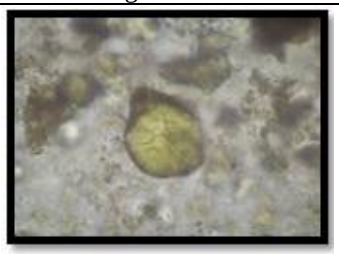
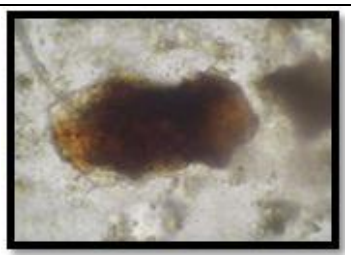
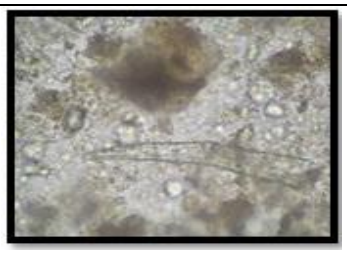
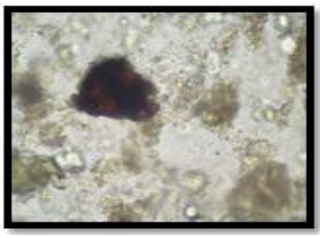
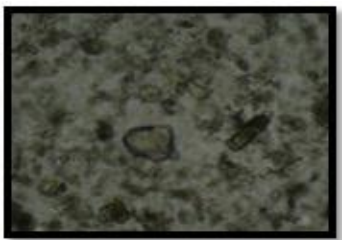
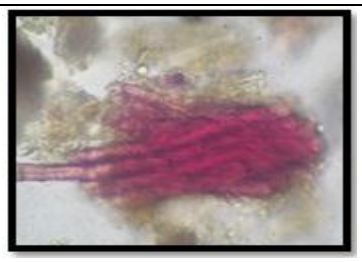
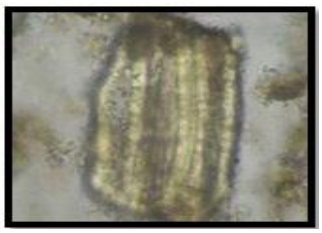
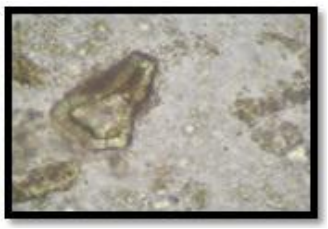
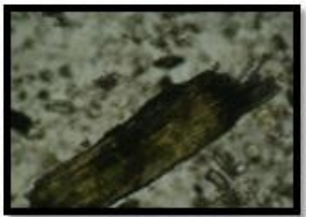
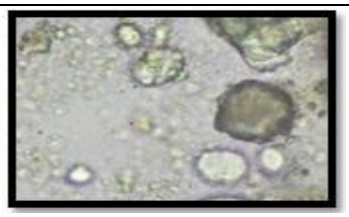
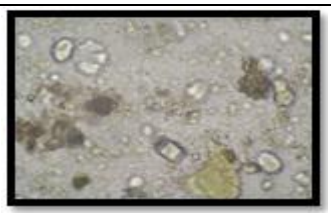
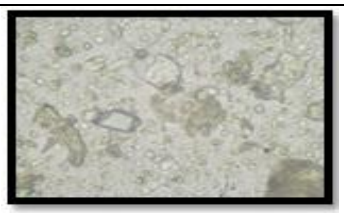
Analytical Study

The loss on Drying, ash value, hardness, soluble extractive values was scientifically studied and the values are depicted in the table no. 3.

HPTLC study results

On performing HPTLC, visual observation under UV light showed few spots but on analyzing under densitometer much more was observed (Plate-2) and at 254nm, the chromatogram showed 9 peaks with Rf values 0.26, 0.46, 0.57, 0.61, 0.74, 0.82, 0.87, 0.95, 0.99 While at 366nm the chromatogram showed 6 peaks with Rf values 0.26, 0.35, 0.46, 0.65 0.79, 0.99 (Table-3 and Plate-4).

Plate 1. Microphotographs of *Gokshuradi Guggulu*

 Starch grains-Haritaki	 Starch grains-Bibitaki	 Starch grains-Musta
 Stone cells-Pippali	 Stone cells-Gokshura	 Tannins- Haritaki
 Trichoma-Bibitaki	 Tannin –Musta	 Silica deposition-Musta
 Scleroids-Gokshura	 Scleroids-Haritaki	 Scleroids–Haritaki
 Scleroids-Bibhitaki	 Scleroids-Amalaki	 Scleroids fibres-Gokshura
 Rosette Crystals-Bibitaki	 Rhomboidal crystals-Gokshura	 Prismatic Crystals -Gokshura

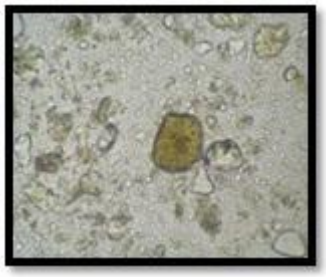
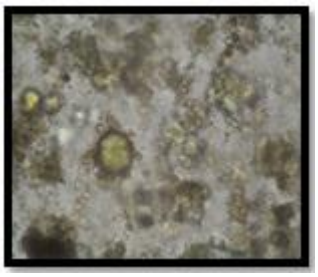
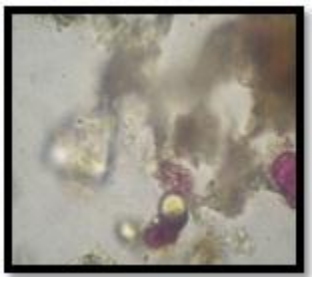
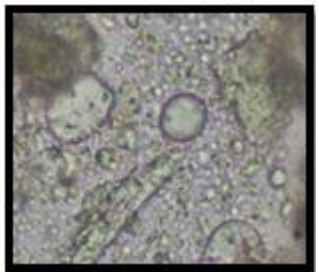
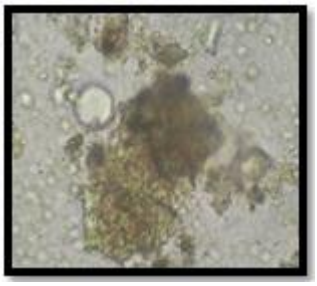
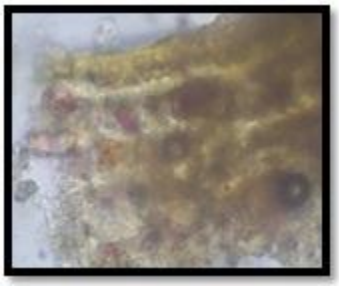
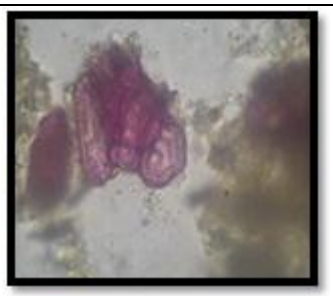
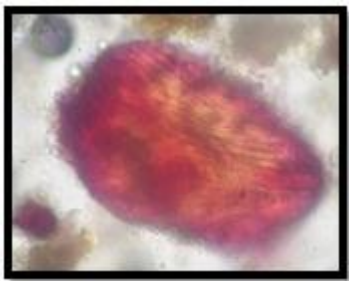
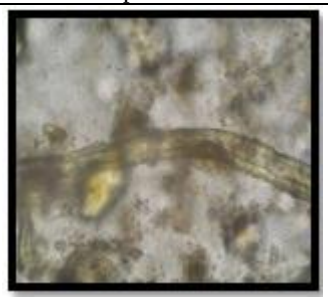
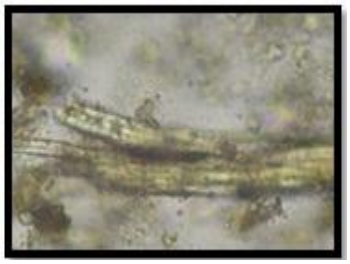
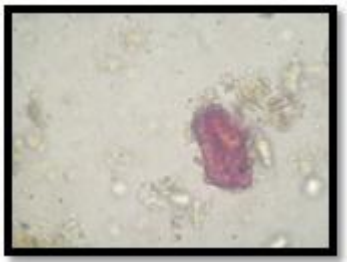
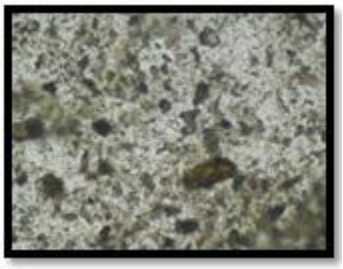
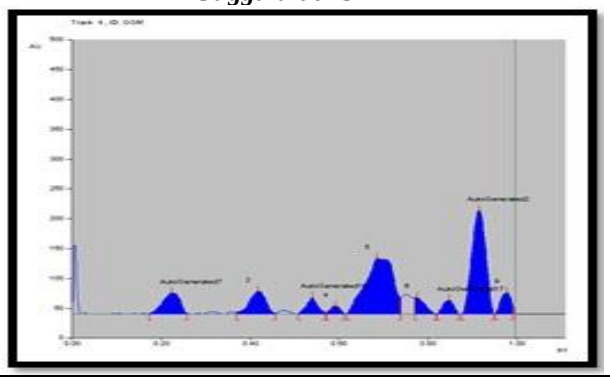
 Oleo resin-Shunti	 Oil globules-Shunti	 Oil globules-Pippali
 Oil globules-Musta	 Mesocarp cells-Bibhitaki	 Mesocarp cells-Amalaki
 Group of stone cells-Pippali	 Sclerenchyma –cellsGokshura	 Fibres-Musta
 Fibres-Gokshura	 Bottle neck shaped stone cells-Maricha	 Black debris-Maricha

Plate 2. Densitogram of *Gokshuradi Guggulu*

Densitogram curve of Methnol extract of of *Gokshuradi Guggulu* at 254 nm



Densitogram curve of Methnol extract *Gokshuradi Guggulu* at 366nm

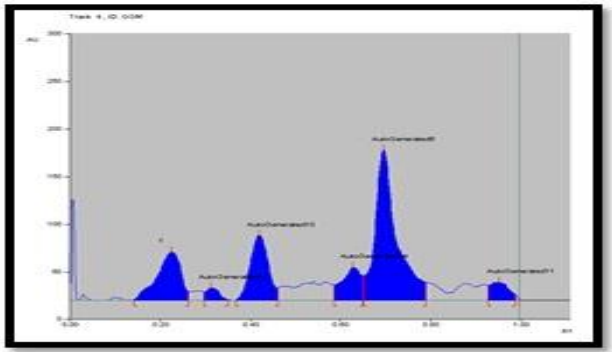


Plate 3. HPTLC Plates of Methanolic extract of *Gokshuradi Guggulu*

254 nm

366 nm

Table 1. Ingradients of *Gokshuradi Guggulu*

S.No	Ingredient	Botanical name	Part used	Ratio
1	Gokshura	*Tribulus terrestris (L.)*	Fruit	1120 gms
2	Guggulu	*Commiphora mukul (Arn.)*	Gum	280 gms
3	Hareetaki	*Terminalia chebula (Retz.)*	Fruit	40 gms
4	Bibheetaki	*Terminalia belerica(Roxb.)*	Fruit	40 gms
5	Amalaki	*Emblica officinale (Gaertn.)*	Fruit	40gms
6	Shunthi	*Zingiber officinale(Rosc.)*	Rhizome	40 gms
7	Mareecha	*Piper nigrum (L)*	Fruit	40 gms
8	Pippali	*Piper longum (L.)*	Fruit	40 gms
9	Musta	*Cyperus rotandus (L)*	Tuber	40 gms

Table 2. Organoleptic parameters of *Gokshuradi Guggulu*

Characters	Results
Taste	Kashaya, Tikta
Color	Greyish dark
Odor	Characteristic
Form	500 mg, Hard

Table 3. Physico-Chemical parameters of the *Gokshuradi Guggulu*

Parameters	*Gokshuradi Guggulu*
Loss on Drying at 110^{o} c	6.65 % w/w
Ash value	22.44 % w/w
Hardness	2.465 kg/mtr^{2}
Water soluble extractive	29.6 % w/w
Methanol soluble extractive	16.1 % w/w
pH value	5.0
Acid insoluble ash	18.02 % w/w

Table 4. Results of HPTLC of the *Gokshuradi Guggulu*

Extract	Solvent system	Drug name	Wave lengths	Spots	Rf value
Methanol	Toluene:Ethylacetate: Acetic Acid (7:2:1)	*Gokshuradi Guggulu*	254 nm	9	0.26,0.46,0.57,0.61,0.74,0.82,0.87, 0.95,0.99
			366 nm	6	0.26,0.35,0.46,0.65,0.79,0.99

DISCUSSION

Pharmacognostical evaluation of *Gokshuradi Guggulu* showed the specific characters ofall the ingredients which were used in the preparation this showed that the quality of the finished product Guggulu and Pippali's prabhava is Rasayana. The *Rasayanas* act like conservators of glucose utilization, potentiate oxygen delivery systems, improves cell membrane permeability [15], anti-oxidants. Gokshura possess madhura rasa and vipak, sheeta in veerya, guru snigdha qualities hence acts as vatahara and basti shodhan, therefore act on Madhumeha, as it is of having the predominace of vatadosha, in otherwards acts as Vyadhishamaka this is how useful so in Diabetic Polyneuropathy, Guggulu having ushnaveerya so helps in pacifying the vatadosha, also it is kapha-vatahara, prabhava is Rasayana. Amalaki and Pippali are also possess Rasayana quality, *Rasayana* like free radical scavengers can be used to target mitochondrial activity, neurotransmitter synthesis and degradation, accumulation and removal of modified lipids and proteins, intracellular Ca^{2+} concentration, Oxidative stress. Haritaki is having lavanavarjita pancha rasa, Ushnaveerya, Madhuravipak, so only tridoshahara and brimhana, most of these qualities are against to the qualities of vata, this is how is useful in Diabetic Polyneuropathy. The quantitative pharmaceutical analysis was in normal range and in accordance with those mentioned in reference. *Gokshuradi Guggulu* contain these phytochemical on qualitative analysis.

CONCLUSION

Pharmacognostical findings confirm the ingredients present in the finished product and there is no major change in the microscopic structure of the raw drugs during the pharmaceutical processes of preparation of *Gokshuradi Guggulu*. The results of this study may be used as the reference standard in further research undertakings of its kind.

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