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Pharmacognostical and Pharmaceutical Evaluation of *Triphladya Guggulu* in the Management of Hypothyroidism

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ABSTRACT

Hypothyroidism is emerging as one of the global health issues. The analysis of the symptomatology of Hypothyroidism in the light of *Ayurvedic* principles reveals that the pathogenesis and manifestations of hypothyroidism occurs due to dysfunction of *Agni*. The trial drug *Triphladya Guggulu*, cited in *Yogaratanakara* for the management of *Gandamala*, contains *Deepana*, *Pachana*, *Anulomana* and *Vatakapha shamaka* drugs, targeting the *Agni* which is the main seat of pathogenesis. Pharmacognostical & Analytical study of *Triphaldya Guggulu* has been carried out for the evaluation of its efficacy in *Hypothyrodism*. On pharmacognostical study, Starch grains & fibres of *Shunthi*, Black debris of *Maricha*, Epidermal cells with Oil Globules & stone cells of *Pippali*, Sclerides of *Haritaki* & *Vibhitaki*, Trichoma of *Vibhitaki*, Tannin content of *Haritaki*, Fibres & silica deposition of *Amalaki*, Prismatic crystals & stone cells of *Kanchnara* were identified. Analytical study showed 10 spots at 254 nm and 11 spots at 366 nm.

Keywords: Hypothyroidism, *Triphladya Guggulu*, *Gandamala*, Pharmacognosy.

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INTRODUCTION

Hypothyroidism or underactive thyroid results in reduced secretion and functioning of Thyroid hormones which leads to a great thrashing to the body, as every cell of the body has thyroid receptors. Decreased hormone secretion decreases basal metabolic rate and leads to a huge set of clinical manifestations. The most common cause of Hypothyroidism is Hashimoto's disease, which is an Autoimmunity disorder. The concept of *Ama* very well reflects Autoimmunity. Having a keen insight to the pathogenesis of hypothyroidism according to the principles of Ayurveda, we find that it is basically caused due to dysfunctioning of the *Agni*. Hypofunctioning of *Jatharagni*, which in turn, affects *Dhatvagni*, eventually, brings out pathological sequence & ultimately, the diseased condition develops.¹ Looking in to the clinical presentation of hypothyroidism, involvement of *Tridosha* can be thought of, in which *Kapha Dosha* is main culprit associated with *Pitta Dushti* and *Margavaranajanya Vata Vriddi*, and *Rasavaha* and *Medovaha strotodushti* predominantly.

The trial drug *Triphladya Guggulu* explained in *Yogaratanakara* for the management of *Gandamala*. *Triphladya Guggulu* consists of – *Guggulu* in combination with *Trikatu*, *Triphala* and *Kanchnara* which are easily available, cheap & affordable. *Guggulu* is a magical remedy in many diseases. It removes blocks in various channels of the body and facilitates easy transportation of nutrients and essentials. *Purana Guggulu* possesses *Deepana*, *Anulomana*, *Lekhana* and *Vatakapha Shamaka* properties and has been indicated in *Gandamala*, and *Shotha*, which are the core manifestations of the disease. It is also a potential analgesic. *Trikatu* is known to have *Deepana* and *Vatakapha Shamaka* properties. *Deepana dravyas* prevent formation of *Ama* thereby preventing damage by keeping *Samagni*. *Triphala* has *Tridosahara* properties and supports healthy digestion and absorption. It is a powerful antioxidant, protecting cells from the damage of free radicals.^{2,3} Constipation, which is one of the clinical manifestations of the disease, can impair hormone clearance and cause elevation in oestrogen, which in turn raises thyroid binding globulin (TGB) levels and decrease the amount of thyroid hormones available to the body.⁴ Thus, *Triphala* can prove to be beneficial in avoiding constipation which is not only the etiological factor but also one of the clinical consequences of hypothyroidism. *Kanchnara* has its established role in the management of Hypothyroidism. The reported pharmacological activities of *Kanchnara* are anti-oxidant, anti-inflammatory, immunomodulatory.⁵

MATERIALS AND METHOD

Collection of raw drug

The raw drugs for the preparation of *Triphladya Guggulu* were procured from the Pharmacy, Gujarat Ayurved University, Jamnagar. The ingredients & parts used in the preparation of the final product are listed in the table 1.

Table 1: Contents of *Triphladya Guggulu*

Sr.	Drug	Latin Name	Part used	Quantity
1.	<i>Shunthi</i>	<i>Zingiber officinale Roxb.</i>	Rhizome	1 Part
2.	<i>Pippali</i>	<i>Piper longum Linn.</i>	Fruit	1 Part
3.	<i>Maricha</i>	<i>Piper nigrum Linn.</i>	Fruit	1 Part
4.	<i>Amalaki</i>	<i>Emblica officinale Gaertn</i>	Fruit	} 1 Part
5.	<i>Haritaki</i>	<i>Terminalia chebula Retz.</i>	Fruit	
6.	<i>Bibhitaki</i>	<i>Terminalia belerica Roxb.</i>	Fruit	
7.	<i>Kanchnara</i>	<i>Bauhinia variegata</i>	Twak	6 Parts
8.	<i>Guggulu</i>	<i>Commiphora mukul(Hook ex Stocks)Engl.</i>	Resin	10 Parts
9.	<i>Madhu</i>	<i>Honey</i>	-	Q.S

Preparation of drug

The final product i.e. *Triphladya Guggulu* was prepared in the pharmacy, Gujarat Ayurved University, Jamnagar.

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 like Taste, Colour, odour and touch were scientifically studied in Pharmacognosy laboratory, I.P.G.T. & R.A., Gujarat Ayurved University, Jamnagar, Gujarat, India.⁶

Microscopic Study

Triphladya Guggulu was powdered and dissolved with water and microscopy of the sample was done without stain and after staining with Phloroglucinol + HCl. Microphotographs of *Triphladya Guggulu* was also taken under Corl-zeiss trinocular microscope.⁷

Physico-chemical analysis

Triphladya Guggulu was analyzed using various standard physico-chemical parameters such as Loss on drying, water soluble extract, and alcohol soluble extract etc.⁸

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

(14:4:2) solvent system and observed under visible light. The colour and R_f values of resolved spots were noted.⁹

RESULTS AND DISCUSSION

Organoleptic characters of *Triphladya Guggulu*

Organoleptic characters of *Triphladya Guggulu* such as color, odour, taste etc. examined by sensory organs and results are as shown in Table 2.

Table 2: Organoleptic characters of *Triphladya Guggulu*:

Sr. No.	Characters	Results
1	Colour	Brownish Black
2	Odour	Characteristic
3	Taste	Strong pungent
4	Weight of Each Vati	500 mg

Microscopic characters of *Triphladya Guggulu*

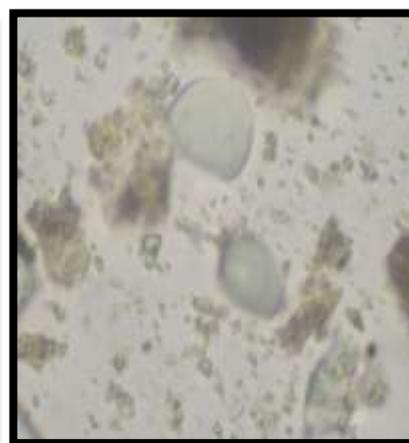
Diagnostic characters of *Triphladya Guggulu* were observed under the microscope and presence of all ingredients showed their different characters, these are Prismatic crystals of *Kanchnara*, Epidermal cells with oil globules of *pippali*, Starch grains of *Shunthi*, Black debris of *Maricha*, Fibres and Stone cells of *Kanchnara*, Stone cells of *Pippali*, Trichoma of *Vibhitaki*, Fibres of *Shunthi*, Sclerides of *Haritaki* and *Vibhitaki*, Fibres and silica deposition of *Amalaki*, Tannin content and stone cells of *Haritaki* and Group of stone cells of *Maricha*. (Plate 1. Figure. 1-17).



1. Prismatic Crystals of *Kanchnara*



2. Edipdermal cells with oil globules of *Pippali*



3. Starch grains of *Shunthi*



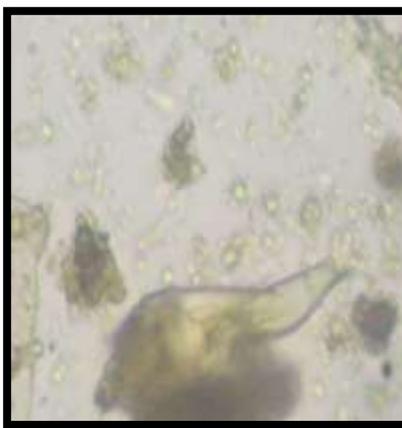
4. Black debris of *Pippali*



5. Fibres of *Kanchnara*



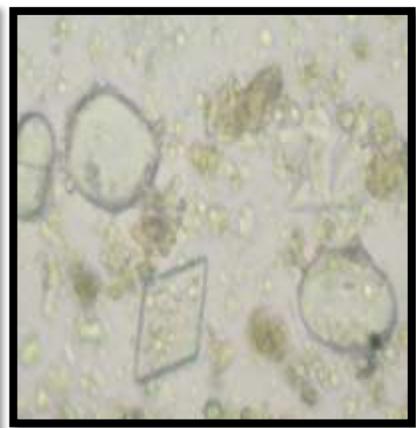
6. Stone cells of *Kanchnara*



7. Trichomes of *Vibhitaki*



8. Fibres of *Shunthi*



9. Prismatic crystals of *Kanchnara*



10. Sclerides of *Haritaki*



11. Fibres of *Amalaki*



12. Sclerides of *Vibhitaki*

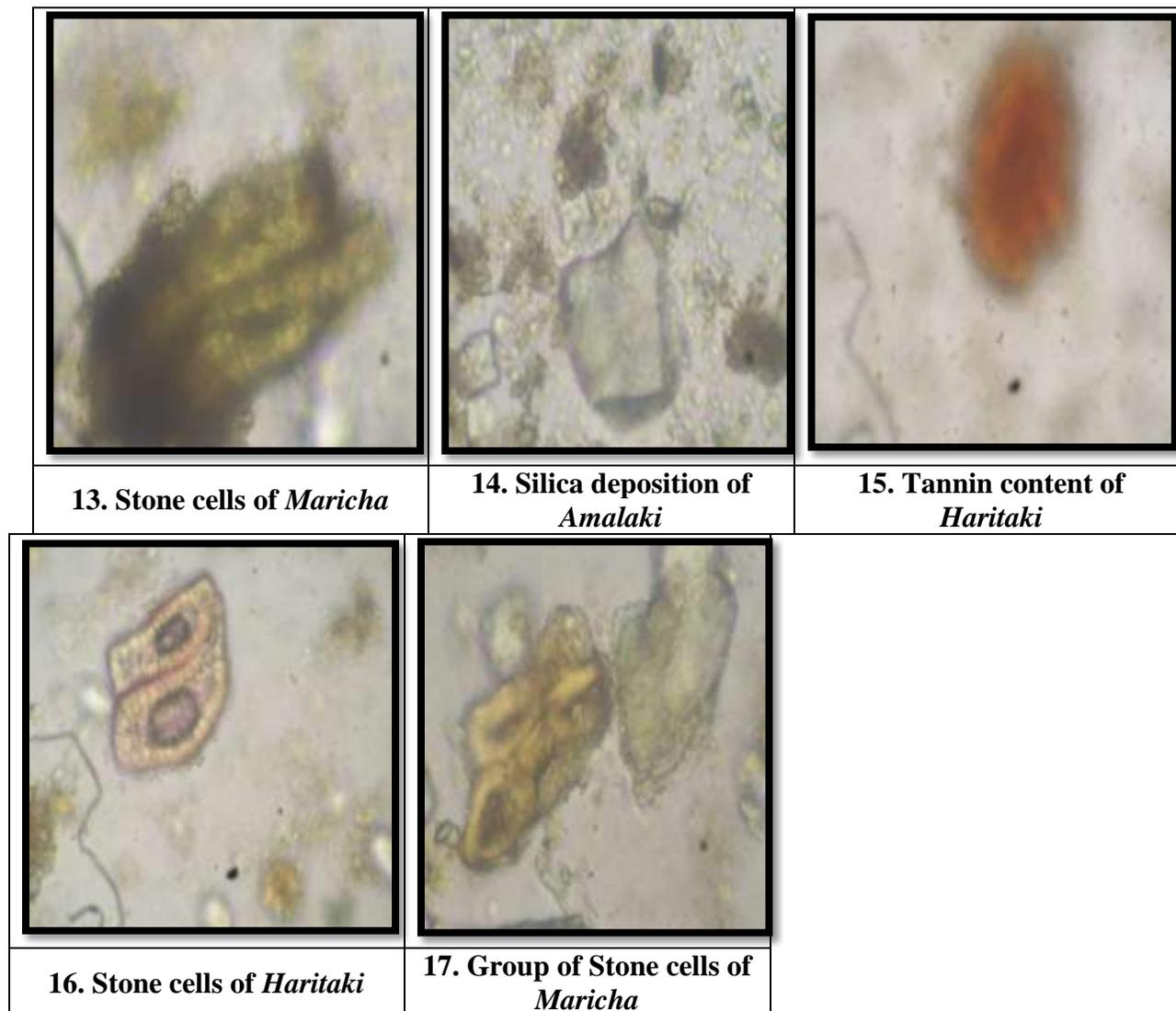


Plate 1: Microphotographs of *Triphladya Guggulu*

Physicochemical parameters of *Triphladya Guggulu*

Physicochemical parameters of *Triphladya Guggulu* such as ash value, water soluble extract, alcohol soluble extract, pH etc. results are show in Table 3.

Table 3: Physicochemical parameters of *Triphladya Guggulu*

Sr. No.	Test	Result
1	Weight Variation	
	Mean Weight	0.607 gm
	Highest Weight	0.704 gm
	Lowest Weight	0.561gm
2	Hardness of Tablet	NA
3	Loss on Drying	13.645 % w/w
4	Ash Value	10.833 % w/w
5	Water soluble extract	53.301 % w/w
6	Methanol soluble extract	21.320% w/w
7	pH	6.5

HPTLC Study

Chromatogram shows 10 prominent spots at 254nm with maximum R_f value 0.03, 0.19, 0.37, 0.49, 0.60, 0.67, 0.72, 0.80, 0.85, 0.92 and 11 spots at 366nm with maximum R_f value 0.03, 0.13, 0.22, 0.37, 0.44, 0.49, 0.54, 0.61, 0.68, 0.75, 0.85. (Plate 2 (Figure 1-2), Plate 3)

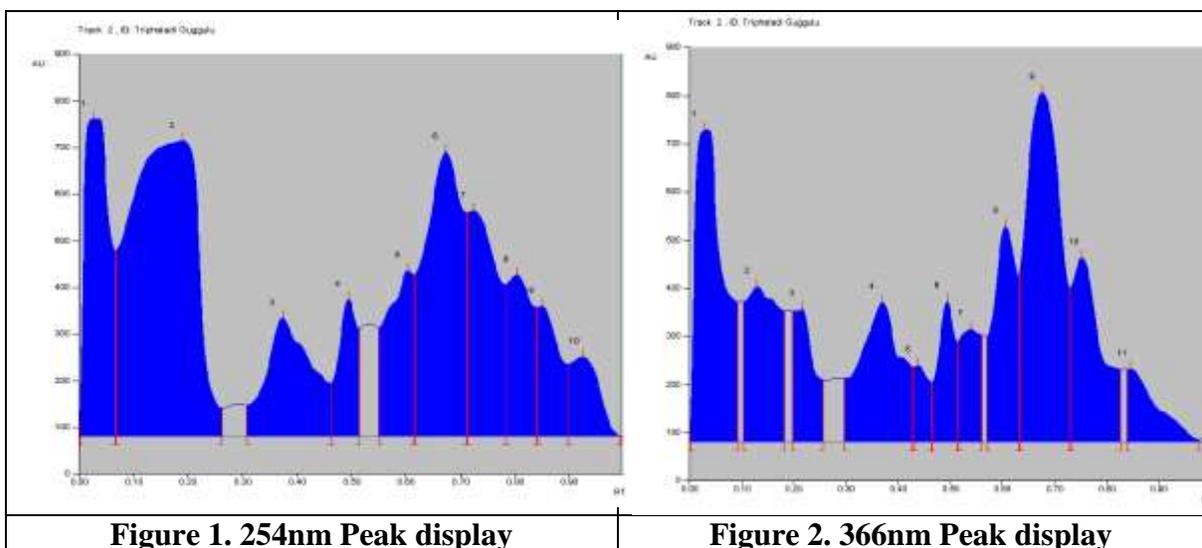


Figure 1. 254nm Peak display

Figure 2. 366nm Peak display

Plate 2 (Figure 1-2): HPTLC: at 254 nm & 366 nm of *Tripladya Guggulu*

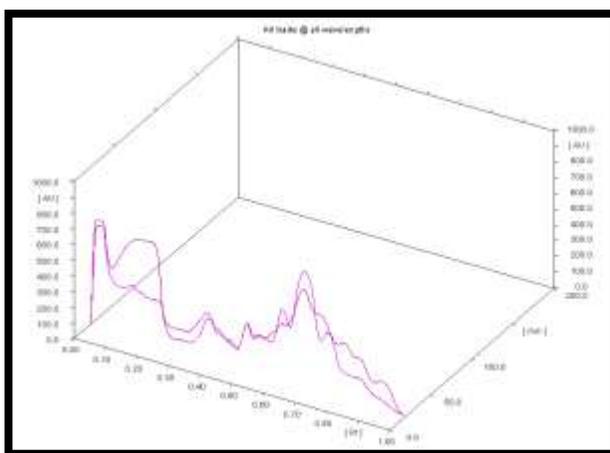


Figure 3: 254nm & 366nm 3D

Pharmacognostical study reveals authentication of *Tripladya Guggulu* was cross verified with standard reference API. The Starch grains, stone cells, epidermal cells with oil globules, trichomes, fibres, prismatic crystals, tannin, Silica deposition were observed under the microscope which were used as ingredients. All the physico-chemical parameters i.e. Loss on drying, Water soluble extract, Methanol soluble extract and pH value were analyzed and found to be within the normal reference range. The physicochemical analysis showed Loss on drying (13.645% w/w), Water soluble extract (53.301 % w/w), Methanol soluble extract (21.320% w/w). 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 + Ethyl acetate +Acetic acid (14:2:2) solvent system and observed under visible light. The colour and R_f values of resolved spots were noted.

CONCLUSION

Pharmacognostical study findings confirm that all characters were found in ingredient drugs of *Triphladya Guggulu*. The physicochemical parameters discussed here may be used as identifying tools for the quality assessment of *Triphladya Guggul*

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