



Pharmacognostical and Pharmaceutical Analysis of *Dhatri Bhallataka vati*- For Primary Adult Hypothyroidism

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Abstract

Dhatri Bhallataka Vati is a polyherbal formulation containing various Ayurvedic medicinal drugs and is mentioned in *Aayurveda Nibandhamala*, specially indicated for the treatment of *Ama*, *Ajirna*, *Gulma* and in the condition of *Agnimandhya*. Hypothyroidism is a clinical syndrome resulting from deficiency of thyroid hormones due to their insufficient synthesis which in turn results in a generalized slowing down of metabolic processes. It affects the metabolism of the body even at cellular level and can affect any organ virtually. *Dhatri Bhallataka Vati* can be a promising formulation in the management of hypothyroidism. In the present study, an attempt has been made to develop pharmacognostical and pharmaceutical standards for *Dhatri Bhallataka Vati*. For assurance of quality of herbal compounds pharmacognostical and pharmaceutical analysis should be done. **Methods:** *Dhatri Bhallataka Vati* was subjected to microscopic evaluation for pharmacognostical study, physico-chemical analysis like hardness, weight variation, loss on drying, ash value, acid insoluble extract, pH value, water soluble extract, alcohol soluble extract, and high Performance thin layer chromatography (HPTLC). **Results:** Pharmacognostical study showed the presence of certain identifying characters of all of the ingredients of *Dhatri Bhallataka Vati* that is *Amalaki*, *Bhallataka*, *Shunthi*, *Pippali*, *Maricha*, *Haritaki*, *Bibhitaki*, *Krishna Tila* and *Purana Guda*. In pharmaceutical study, preliminary physico-chemical analysis showed that hardness of *Vati* was 3.5 Kg/cm², ash value 07.95%w/w, loss on drying 06.01%w/w, water soluble extract 26.44%w/w, alcohol soluble extract 30.60%w/w. HPTLC analysis showed eleven spots in 254nm and eight spots in 366nm. **Conclusion:** Present work was carried out to standardize the polyherbal formulation *Dhatri Bhallataka Vati* in terms of its identity, quality and purity. Pharmacognostical and physico-chemical observations revealed the specific characters of all active constituents in the preparation.

Keywords

Dhatri Bhallataka Vati, Pharmacognosy, Pharmaceutics, Hypothyroidism.

INTRODUCTION:

Hypothyroidism may result from inadequate function of the gland itself (primary Hypothyroidism), inadequate stimulation by thyroid-stimulating hormone from the pituitary gland (secondary Hypothyroidism), or inadequate release of thyrotropin-releasing hormone from the brain's hypothalamus (tertiary Hypothyroidism)

As it easily responds to stress and stimuli, hence the global incidence of hypothyroidism is increasing day by day in today's world. It is not only confined to metropolitan population but also extends to rural areas.

Hypothyroidism is one of the common functional disorders of thyroid gland and is a frequently encountered problem in clinical practice. Hypothyroidism is posing a major health challenge in both developing as well as developed world. 1 in 10 Indian adults carry the risk of Hypothyroidism. Adults in age group of 35+ are at higher risk. The chances of women getting affected by Hypothyroidism are three times more as compared to men. Over 8% of Indian population is at a higher future risk of getting affected and 1/3rd of the hypothyroid patients are unaware of the conditionⁱ. In spite of many advances, the modern management of Hypothyroidism still remains unsatisfactory. It is a major risk factor for many serious illness and thyroidism itself can result in threatening condition, thus it leads to affected person to remain dependent on hormonal replacement throughout his life. Excessive thyroid hormone replacement carries the potential for serious long term metabolic complications (e.g., accelerated osteoporosis, drug intolerance, hypersensitivity, the danger of acute and chronic complications). The more important is to search out safe, effective and cheaper remedies. Looking into the pathogenesis and complications of Hypothyroidism, it requires a systemic and radical therapy for which Ayurveda may provide a ray of hope through *Shamana Chikitsa* or *Rasayana*.

For the present study *Dhatri Bhallataka Vati*, a polyherbal formulation contains different amount of ten herbal drugs (Table no 1) that is *Bhallataka* (*Semicarpus anacardium* Linn), *Shunthi* (*Embelia ribes* Burm), *Pippali* (*Piper longum* Linn.), *Haritaki* (*Terminalia chebula* Retz.), *Bibhitaki* (*Terminalia bellirica* Roxb.), *Amalaki* (*Emblia officinalis* Gaertn.), *Maricha* (*Piper nigrum* Linn), *Krishna Tila* (*Sesamum indicum* Linn). *Dhatri Bhallataka Vati* is mainly indicated for the treatment of *Ama* in a classical text of *Ayurveda* like *Ayurveda Nibandhamala*. It is also indicated for the treatment of *Ajirna*, and in the condition of *Agni Mandhya*. *Dhatri Bhallataka Vati* possesses *Katu*, *Tikta Rasa*, *Laghu*, *Ushna* and *Ruksha*

Guna, *Ushna Virya* and *Madhura Vipaka*. Thus, *Dhatri Bhallataka Vati* mainly pacify *Kapha* and *Vata Dosha*. Pharmacognosy is also the first step to standardize a drug which is the need of the day. It should be noted that herbal drug standardization is not new in the field of *Ayurveda*. In the classics it is mentioned in a codified manner, such as *Grahya Lakshana*, Method of collection etc. It is a timely necessity followed by compulsion to go for quality control of the raw drugs as well as final products using modern parameters. This will not only provide a scientific basis and credibility to Ayurvedic drugs and pharmaceuticals but also help in the globalization of *Ayurveda*.

AIMS AND OBJECTIVES:

1. To evaluate raw drugs of *Dhatri Bhallataka Vati* for authenticity through various pharmacognostical procedures.
2. To develop the pharmacognostical and phytochemical profile of *Dhatri Bhallataka Vati*.

MATERIALS AND METHODS:**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 Laboratory, Institute for Post Graduate Teaching and Research in Ayurveda, Gujarat Ayurved University, Jamnagar.

Preparation of Drug

Fine powder of all ingredient of *Dhatri Bhallataka Vati* were taken in equal parts. Fine powder of *Triphala* and *Trikatu* *Bhallataka*, *Guda* and *Tila* mixed properly to form *Vati*. *Vati* prepared as per *Vati* method, made into vati of 250mg was prepared and preserved in hygienic condition.ⁱⁱ

PHARMACOGNOSTICAL STUDY

The Pharmacognostical study comprises of organoleptic study and microscopic study of finished product.

Organoleptic Study

The Organoleptic characters of polyherbal 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 *Dhatri Bhallataka Vati* were scientifically studied as per the standard references.

Microscopic Study

Dhatri Bhallataka Vati was powdered and dissolved with water and microscopy of the sample was done without stain and after staining with phloroglucinol + HCl. Microphotographs of *Dhatri Bhallataka Vati* were also taken under Cori-zeisstrinocular microscope.ⁱⁱⁱ

PHYSICO-CHEMICAL ANALYSIS

Dhatri Bhallataka Vati was analyzed using various standard physico-chemical parameters. The common parameters mentioned for compressed tablets in Ayurvedic Pharmacopeia of India,^{iv} and CCRAS^v, guidelines are loss on drying, total ash value, acid insoluble ash, pH value, water soluble extract, methanol soluble extra total ash, and water and alcohol soluble extractives.

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 (7:2:1) solvent system and observed under visible light. The colour and R_f values of resolved spots were noted.

RESULTS AND DISCUSSION:

Organoleptic characters of *Dhatri Bhallataka Vati*

Organoleptic characters contents of *Dhatri Bhallataka Vati* like colour, taste, touch, odor were recorded. The color of *Dhatri Bhallataka Vati* was black. *Dhatri Bhallataka Vati* contain its characteristic smell and Katu, Tikta and Kashaya taste which is shown in Table -2.

Microscopic Study of *Dhatri Bhallataka Vati*

Identifying characters of ingredients of *Dhatri Bhallataka Vati* under the microscope were epicarp, Fibers, iodine stained starch grains and simple starch grains of *Shunthi*, black debris, lignified stone cells, rhomboidal crystal and stone cells, bottle neck stem cell of *Pippali*, brown tennin content and lignified stone cells, scleroids of *Haritaki*, trichome of *Bibhitaki*, scleroid of *Amalaki* mesocarp cell with oil content, pitted stone cells field with oleoresin and stone cells, prismatic crystal of *Bhallataka*, Black daberries, lignified stone cell of *Maricha*. Oil globules, rounded crystalline material, endosperm cell of *Tila*. [Plate 1(1 to -17)].

Physico-chemical analysis of *Dhatri Bhallataka Vati*

Physico-chemical analysis of *Dhatri Bhallataka Vati* revealed the value as hardness 3.5 Kg/cm², ash value 07.95%w/w, loss on drying 06.10%w/w, water soluble extract 26.44%w/w, alcohol soluble extract 30.60%w/w and pH value was 6.5. [Table No-3.]

High performance thin layer chromatography of *Dhatri Bhallataka Vati*.

On performing HPTLC, the chromatogram of *Dhatri Bhallataka Vati* showed 11 peaks with maximum R_f values 0.06, 0.22, 0.31, 0.38, 0.42, 0.53, 0.56, 0.66, 0.73, 0.79 and 0.81 at short wave UV 254nm; while at long wave UV 366 nm, the chromatogram showed 8 spots with maximum R_f values 0.06, 0.22, 0.32, 0.35, 0.38, 0.56 and 0.73. [Table No.4]

Table 1: Ingredient of *Dhatri Bhallataka Vati*

SI NO	DRUG	BOTINICAL NAME	PART USED	PROPORTION
1	<i>Shuddha Bhallataka</i>	<i>Semecarpus anacardium</i> Linn	Fruit	8
2	<i>Haritaki</i>	<i>Terminalia chebula</i> Retz.	Fruit	4
3	<i>Bibhitaki</i>	<i>Terminalia bellirica</i> Roxb.	Fruit	4
4	<i>Aamalaki</i>	<i>Emblica officinalis</i> Gaertn.	Fruit	4
5	<i>Shunthi</i>	<i>Zingiber officinale</i> Roxb.	Dry Rhizome	3
6	<i>Pippali</i>	<i>Piper longum</i> Linn.	Fruit	3
7	<i>Maricha</i>	<i>Piper nigrum</i> Linn	Fruit	3
8	<i>Krishna tila</i>	<i>Sesamum indicum</i>	Seed	8
9	<i>Purana Guda</i>			8

Table 2: Organoleptic characters of *Dhatri Bhallataka Vati*

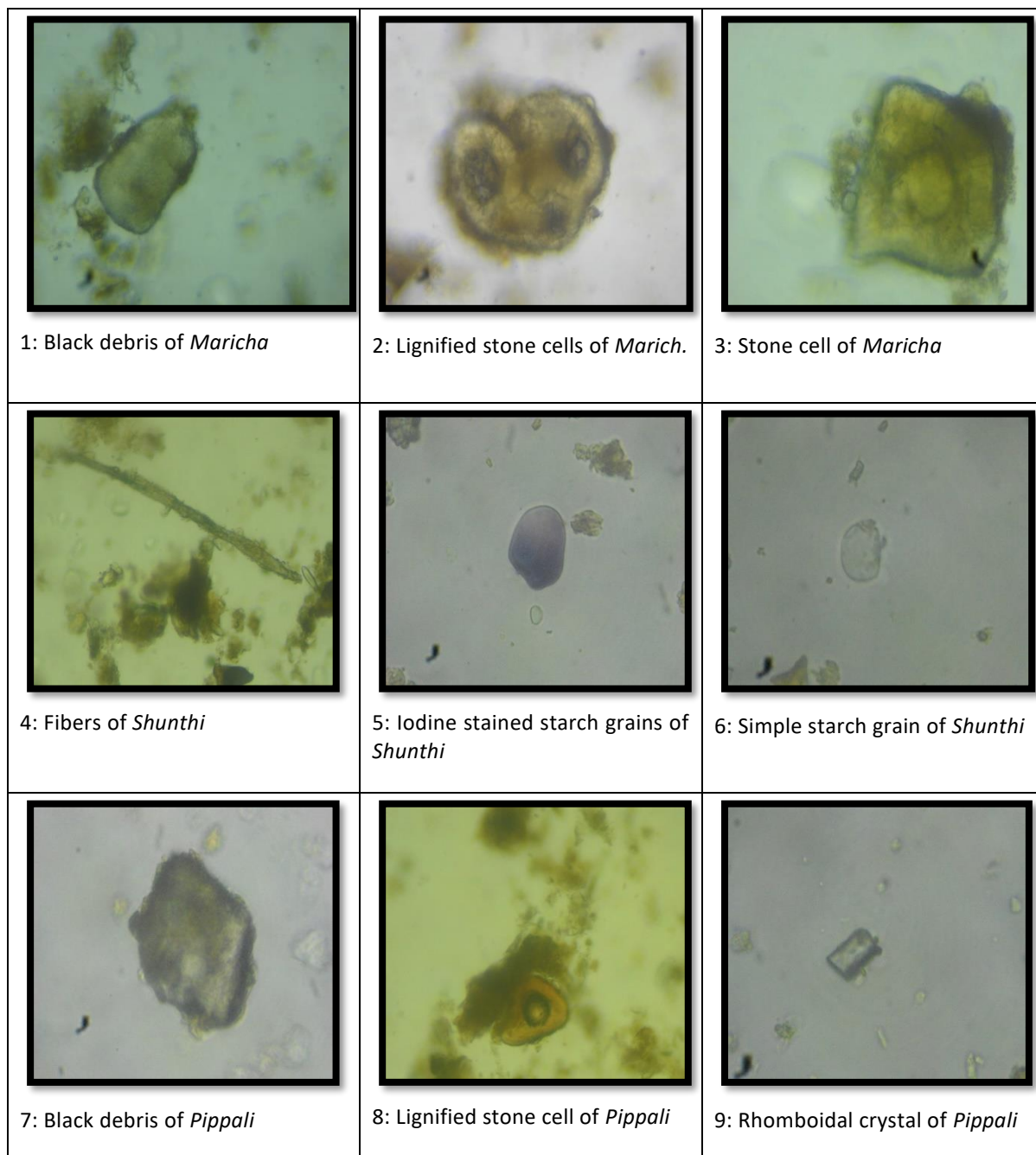
Drug	Colour	Odour	Taste	Consistency
<i>Dhatri Bhallataka Vati</i>	Blackish	Characteristic	<i>Katu, Tikta, Kashaya</i>	Hard, <i>Vati</i>

Table 3: Physico-chemical parameters of *Dhatri Bhallataka Vati*

Name of the Analysis	Value of <i>Dhatri Bhallataka Vati</i> .
Loss on drying percentage	06.10% w/w
Ash value percentage	07.95% w/w
pH value (5% aqueous)	6.5
Water soluble extract percentage	26.44% w/w
Alcohol soluble extract percentage	30.60% w/w
Weight variation of <i>Vati</i>	Average wt. 0.257gm Highest wt. 0.260gm Lowest wt. 0.230gm

Table 4: HPTLC results for methanolic extract of *Dhatry Bhallataka Vati*

	254 nm		366nm	
	No. of Spots	R _f Value	No. of Spots	R _f Value
HPTLC	11	0.06, 0.16, 0.22, 0.33, 0.37, 0.47, 0.59, 0.66, 0.78, 0.87 and 0.90	8	0.07, 0.20, 0.33, 0.35, 0.58, 0.65, 0.83 and 0.91

Plate no 1


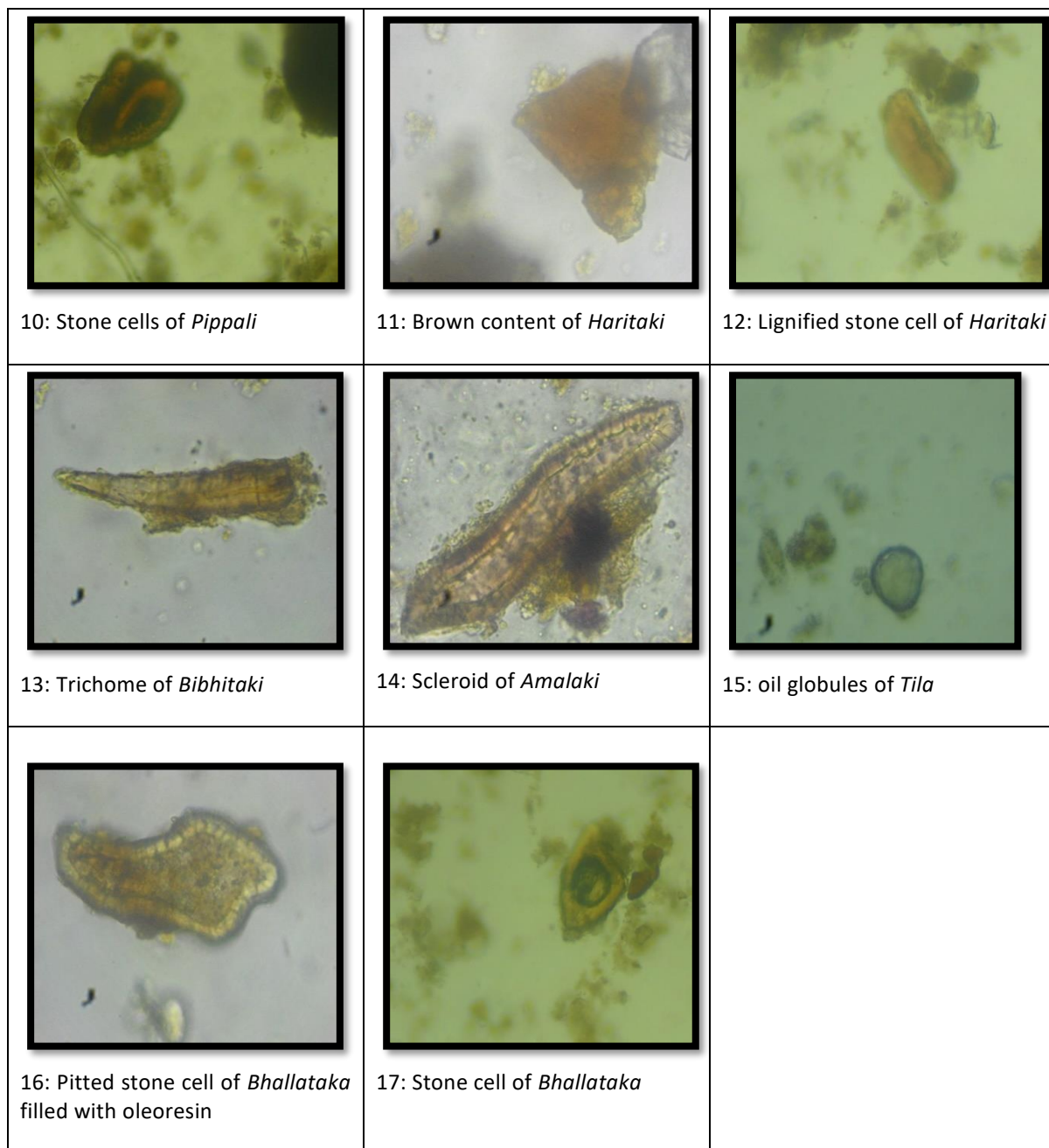


Plate no 2: Densitogram of Dhatri Bhallataka Vati at 254nm and 366nm.

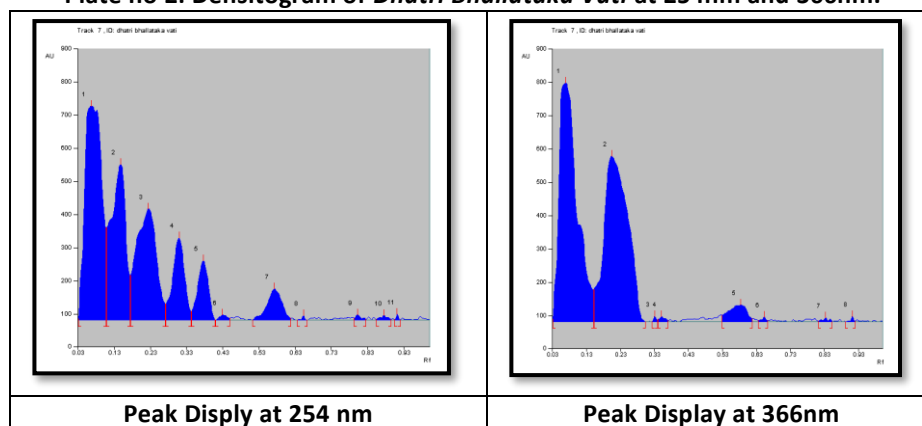
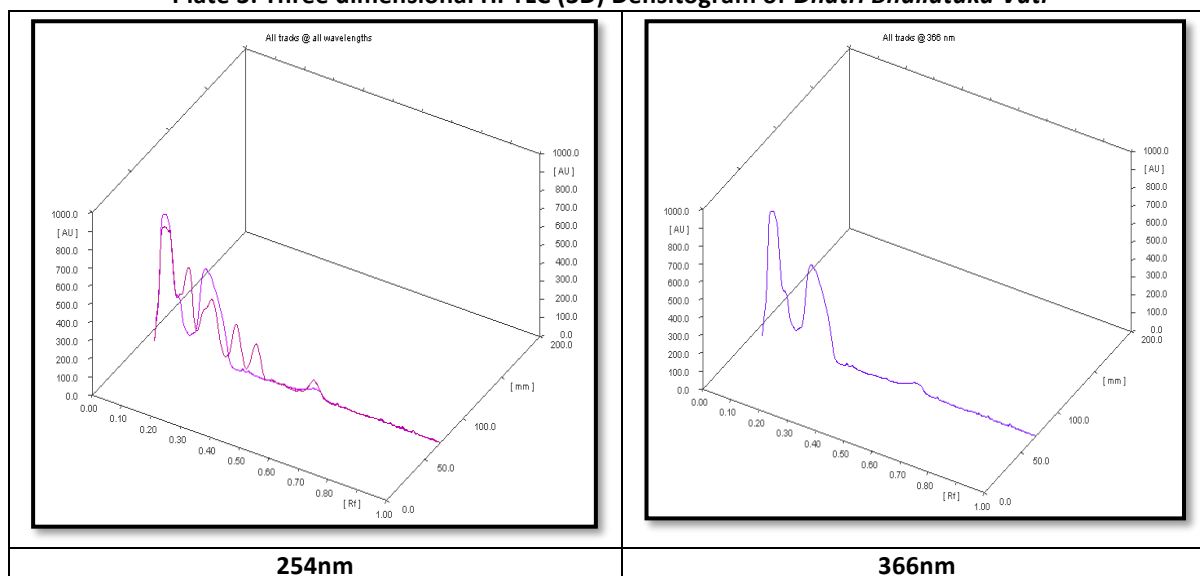


Plate 3: Three dimensional HPTLC (3D) Densitogram of *Dhatri Bhallataka Vati*


CONCLUSION

The Pharmacognostical and physico chemical analysis of *Dhatri Bhallataka Vati* confirmed the purity and genuinity of the drug. A published information is not available on pharmacognostical and physico-chemical profiles of *Dhatri Bhallataka Vati*. 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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