

## Pharmacognostical and HPTLC Assessment of Nisha Swarasbhavit Amalaki Choorna: A Compound Ayurvedic Formulation

Nakum C<sup>1\*</sup>, Singh MP<sup>2</sup>

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<sup>1\*</sup> Chandresh Nakum, Post Graduate Scholar, Department of Dravyaguna, Government Ayurvedic College and Hospital, Patna, Bihar, India.

<sup>2</sup> Mahendra Prasad Singh, Professor, Department of Dravyaguna, Government Ayurvedic College and Hospital, Patna, Bihar, India.

Nisha Amalaki is a prominent formula in Ayurveda that is frequently utilized in the control of Prameha (Diabetes Mellitus). In this study, 3 Bhavna (trituration) of Haridra juice (Swaras) has been provided to Amalaki Choorna (*Embllica officinalis*). Until now, no scientific studies have been documented regarding the impact of Bhavna on Amlaki Choorna with Haridra juice. The current research article is conducted to evaluate the variations in the pharmacognostical profile of Nisha Choorna prior to and following Bhavna and to standardize the formulation via Pharmacognostic and pharmaceutical assessments. Pharmacognostic methods such as lignified Scleroid of Amalaki, mesocarp cells of Amalaki, oil globule of Haridra, etc., were observed. HPTLC was performed in a suitable solvent system, where 10 and 6 spots were identified at 254 nm and 366 nm respectively.

**Keywords:** Nishabhavita Amalaki, HPTLC, Pharmacognostical, Bhavana

| Corresponding Author                                                                                                                                                                                                   | How to Cite this Article                                                                                                                                                                                                                                                                       | To Browse                                                                             |
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| Chandresh Nakum, Post Graduate Scholar, Department of Dravyaguna, Government Ayurvedic College and Hospital, Patna, Bihar, India.<br>Email: <a href="mailto:nakumchandresh11@gmail.com">nakumchandresh11@gmail.com</a> | Nakum C, Singh MP, Pharmacognostical and HPTLC Assessment of Nisha Swarasbhavit Amalaki Choorna: A Compound Ayurvedic Formulation. J Ayu Int Med Sci. 2026;11(1):83-87.<br>Available From<br><a href="https://jaims.in/jaims/article/view/5330/">https://jaims.in/jaims/article/view/5330/</a> |  |

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## Introduction

Diabetes mellitus is a metabolic disorder marked by persistent hyperglycaemia resulting from either an absolute or relative deficiency of insulin. This elevated blood glucose level, if left unmanaged, can progressively impair various organ systems, particularly the vascular and nervous systems.[1] In *Ayurvedic* literature, diabetes mellitus aligns with the condition known as *Prameha* or *Madhumeha*, which is considered a *Tridoshaja* disorder with a predominant involvement of *Kapha Dosha*. Among the classical formulations, *Nisha Amalaki*, as described in the *Ashtanga Hridaya*, is recognized for its therapeutic efficacy in managing this condition. [2] *Amalaki* (*Emblica officinalis*), belonging to the family *Euphorbiaceae*, is characterized by a complex taste profile - comprising sweet, sour, astringent, pungent, and bitter *Rasas*. The second key ingredient, *Haridra* (*Curcuma longa*) from the *Zingiberaceae* family, is known for its *Tridosha-Shamaka* properties.[3] Its bitter taste helps pacify *Pitta Dosha*, while its inherent heat (*Ushna Virya*) balances both *Vata* and *Kapha Doshas*. [4] Despite the traditional use of *Nisha Amalaki*, there is a lack of scientific exploration into the impact of *Bhavana* (levigation) of *Amalaki Choorna* with *Haldi Swarasa*. This study aims to evaluate the pharmacognostical changes in *Nisha-Bhavit Amalaki* before and after *Bhavana* process and to establish standardization parameters through pharmacognostical & pharmaceutical assessments.

## Materials and Methods

Plant material Raw drug materials were collected from the pharmacy of GACH, Patna, Bihar. The ingredients are mentioned in table 1.

**Table 1: Nishabhavit Amalaki.**

| Drug    | Latin name                        | Part used     |
|---------|-----------------------------------|---------------|
| Nisha   | <i>Curcuma longa</i> Linn.        | Rhizome Juice |
| Amalaki | <i>Emblica officinale</i> Gaertn. | Fruit Powder  |

### Pharmacognostical study

Both the raw drugs were identified and authenticated by the Pharmacognosy Department GACH, Patna, Bihar. The identification was carried out on the basis of organoleptic features, morphological features and powder microscopy of drug. Pharmacognostical evaluation of prepared *Choorna* was also carried out.

### Method of preparation of Amlakibhavit Nisha

*Bhavna Samskar* (trituration) was done by triturating the *Amalaki* powder with the freshly prepared juice of *Haridra*. 3 *Bhavna* of *Haridra Swaras* had been given to *Amalaki Choorna*.

### Pharmaceutical Evaluation

#### Physicochemical parameter

*Nishabhavit Amalaki* was analysed by using qualitative and quantitative parameters at COGNOSMED Laboratories Private Limited, Pharmaceutical Laboratory, Patna, Bihar. The common parameters mentioned for compressed tablets in *Ayurvedic Pharmacopodia of India*[5] and *CCRAS*[6] guidelines i.e., total ash, pH value, water, and alcohol soluble extractives were taken. Presence of more moisture content in a sample can create preservation problem. Hence loss on drying was also selected as one of the parameters.[7]

#### High Performance Thin Layer Chromatography Study (HPTLC)

Methanol extract of *Nishabhavit Amalaki* were spotted on precoated Silica Gel 60 F254 aluminium plate as 5mm bands, 5 mm apart and 1 cm from the edge of the plates, by means of a Camag Linomate V sample applicator fitted with a 100 µL Hamilton syringe. Toluene (7 ml),

Ethyl acetate (2 ml), Acetic acid (1 ml) was used as mobile phase. After Development, Densitometric scanning was performed with a Camag TLC scanner III in reflectance absorbance mode at 254 nm and 366 nm under control of win CATS software (V 1.2.1 Camag).[8,9] The slit dimensions were 4 mm x 0.45 mm and the scanning speed was 20 mm/s.

## Results and Discussion

### Pharmacognostic study

The initial purpose of the study was to confirm the authenticity of the drugs used in the preparation of *Nishabhavit Amalaki*. For that, powder of *Nishamalaki* and *Nishabhavit Amalaki* were subjected to organoleptic and microscopic evaluation.

#### Organoleptic evaluation:

Organoleptic features like colour, odour, and taste of *Nishamalaki Choorna* and *Nishabhavit Amalaki* were recorded and are placed at table 2.

**Table 2: Organoleptic features of *Nishabhavit Amalaki***

| SN | Characters | Nishamalaki Choorna | Nishabhavit Amalaki Choorna |
|----|------------|---------------------|-----------------------------|
| 1. | Colour     | Golden Yellow       | Blackish Yellow             |
| 2. | Odour      | Aromatic            | Slightly Aromatic           |
| 3. | Taste      | Astringent          | Sour followed by Astringent |
| 4. | Touch      | Fine                | Fine                        |

**Pharmaceutical Study****Physicochemical parameters**

Physicochemical Parameters of the tablet like Uniformity, Loss on Drying were all found to be within the normal range.

The water soluble extractive and methanol soluble extractive values were found to be 38.34% w/w and 18.52% w/w respectively. Details are placed at table 3.

**Table 3: Physicochemical parameters of *Nishabhavit Amalaki*.**

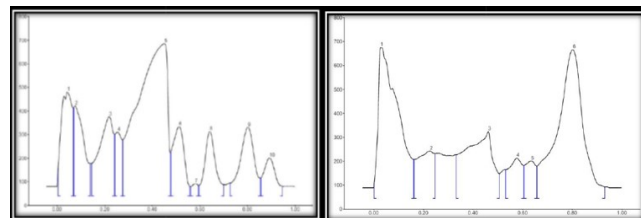
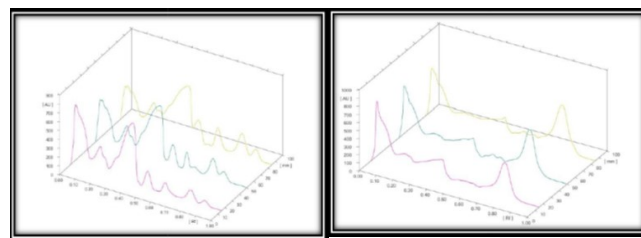
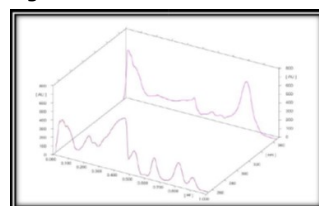
| SN                                      | Test Parameters            | Unit      | Limit   | Test Result           | Test Method          |
|-----------------------------------------|----------------------------|-----------|---------|-----------------------|----------------------|
| A. Physico-chemical Parameters:         |                            |           |         |                       |                      |
| 1.                                      | Loss on Drying at 105°C    | %w/w      | NMT 8   | 4.51                  | API Part-I. Vol.- IX |
| 2.                                      | pH (5% Aqueous Solution)   | %w/w      | 5 to 7  | 6                     | API Part-I. Vol.- IX |
| 3.                                      | Water Soluble Extractive   | %w/w      | NLT 20  | 38.34                 | API Part-I. Vol.- IX |
| 4.                                      | Alcohol Soluble Extractive | %w/w      | NLT 10  | 18.52                 | API Part-I. Vol.- IX |
| 5.                                      | Total Ash                  | %w/w      | NMT 8   | 6.11                  | API Part-I. Vol.- IX |
| 6.                                      | Acid Insoluble Ash         | %w/w      | NMT 1.5 | 0.91                  | API Part-I. Vol.- IX |
| B. Qualitative Study (Sec. Metabolite): |                            |           |         | CML/STP/031           |                      |
| 1.                                      | Tannins                    | ---       | ---     | Present               |                      |
| 2.                                      | Alkaloids                  | ---       | ---     | Present               |                      |
| 3.                                      | Saponin                    | ---       | ---     | Present               |                      |
| 4.                                      | Protein                    | ---       | ---     | Present               |                      |
| 5.                                      | Starch                     | ---       | ---     | Absent                |                      |
| 6.                                      | Carbohydrate               | ---       | ---     | Absent                |                      |
| 7.                                      | Flavonoids                 | ---       | ---     | Present               |                      |
| 8.                                      | Steroids                   | ---       | ---     | Present               |                      |
| C. Heavy Metals:                        |                            |           |         | API Part- I, Vol.- IX |                      |
| 1.                                      | Lead                       | PPM       | 10      | BDL                   |                      |
| 2.                                      | Cadmium                    | PPM       | 0.3     | BDL                   |                      |
| 3.                                      | Arsenic                    | PPM       | 3       | BDL                   |                      |
| 4.                                      | Mercury                    | PPM       | 1       | BDL                   |                      |
| D. Microbiological:                     |                            |           |         | API Part- I, Vol.- IX |                      |
| 1.                                      | Total Microbial Count      | CFU/gmNMT | 600     | 100000                |                      |
|                                         |                            |           |         |                       |                      |
| 2.                                      | Total Yeast & Mould        | CFU/gmNMT | 1000    | Absent                |                      |

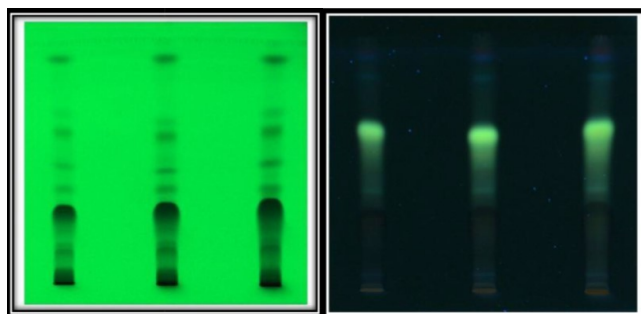
NLT: Not less than, NMT: Not more than, BDL-Below Detection Level, CFU- Colony forming unit, gm-gram, PPM- Part Per Million.w-weight.

**High Performance Thin Layer Chromatography Study**

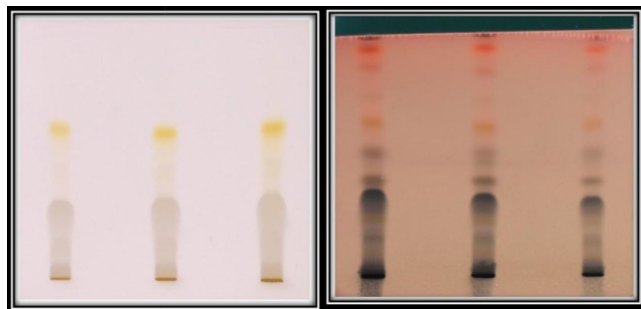
Densitometric scanning of the HPTLC pattern showed 10 spots corresponding to hRf values 04, 08, 22, 26, 45, 51, 58, 64, 80, 90 in short wave UV 254 nm and 6 spot corresponding to hRf values 03, 23, 46, 58, 64, 80 obtained in long wave UV 366nm (Table 4, Plate 1- 1A & 1B).

| 254 nm |      | 366 nm |      |
|--------|------|--------|------|
| Peak   | Rf   | Peak   | Rf   |
| 1      | 0.07 | 1      | 0.16 |
| 2      | 0.14 | 2      | 0.25 |
| 3      | 0.24 | 3      | 0.51 |
| 4      | 0.28 | 4      | 0.61 |
| 5      | 0.48 | 5      | 0.66 |
| 6      | 0.56 | 6      | 0.93 |
| 7      | 0.60 |        |      |
| 8      | 0.70 |        |      |
| 9      | 0.86 |        |      |
| 10     | 0.95 |        |      |

**Plate 1: Densitogram curve of Methanol extract of *Nishabhavit Amalaki*****Figure 1-A at 254 nm****Figure 1-B at 366 nm****Plate 2: 3-D graph of Methanol extract of *Nishabhavit Amalaki Choorna*****Figure 2-A at 254 nm****Figure 2-B at 366 nm****Figure 2-C (MWL)**



Densitometric image 1 of HPTLC plate at  $\lambda$  254nm      Densitometric image 2 of HPTLC plate at  $\lambda$  366nm



Densitometric image 3 of HPTLC plate at  $\lambda$  254nm      Densitometric image 4 of HPTLC plate at  $\lambda$  366nm

## Conclusion

The ingredients were pharmacognostically identified and authenticated prior to formulation. The prepared compound underwent pharmacognostical, physicochemical and HPTLC analyses. Notable differences were observed in the pharmacognostical and phytochemical profiles of *Nishamalaki Choorna* before and after undergoing *Bhavana*. The *Bhavana* process led to the free distribution of cellular components such as oleoresins, oil globules, and disrupted parenchyma cells. Performing 3 *Bhavana* cycles using *Nisha Swarasa* in *Amalaki Choorna* appears to enhance the drug's potency. Preliminary findings suggest that the formulation complies with the qualitative standards outlined in the Ayurvedic Pharmacopoeia of India (API). These results may serve as a reference benchmark for future quality control studies. Clinical evaluation of the formulation is currently underway.

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