

## Comprehensive Evaluation of Analytical Parameter of Pushkarmoola (Inula Racemosa Hook.F.) Root

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### ABSTRACT:

**Background:** Pushkarmoola (Inula Racemosa Hook.f.) is one of the most important plant for medicinal use in Ayurveda. This present study has been carried out to establish the root of plant for its physicochemical characters with different phytochemical qualitative tests as per Ayurvedic Pharmacopoeia of India and High-Performance Thin Layer Chromatographic analysis. Physicochemical parameters showed pH (6.43), Loss on drying (9.50% w/w), Total Ash value (2.90% w/w), Acid insoluble ash (0.32% w/w), water soluble extractive (42.6% w/v) and alcohol soluble extractive (17.6% w/w). Preliminary phytochemical analysis for the presence of various functional groups such as Alkaloids, Flavonoids, Tannin, Saponin, Steroids were also studied. These observations can be helpful for identification and standardization of Pushkarmoola (Inula Racemosa Hook.f.) root.

**KEY WORDS:** Pushkarmoola, Inula Racemosa Hook.f., Root, Physicochemical, Phytochemical, Analytical.

### I. INTRODUCTION

Pushkarmoola, botanically identified as Inula racemosa Hook.f. which belong to Asteraceae family. It is a short herb, mostly found in North-western Himalayas from Kashmir eastward at the altitude of between 1600 and 4200 meters.

Pushkarmoola (Inula racemosa Hook.f.) stem is rough and grooved, flowers are short-stalked, shady yellow daisies with larger, measuring 4-8 cm in diameter which grown in mid to late summer. The flower heads are borne in a spike-like cluster. Leaves are leathery, and upper surface of the leaves is rough. Lower leaves are narrowed to a winged leaf stack, blade elliptic-

lanceolate 18- 45 cm by 13-20 cm, narrowed into petiole as long. The fruits are compressed, slender 0.4 cm long, bearded with 0.75 cm long reddish pappus hairs. Fresh roots have a dull brownish skin with yellowish colour inside. They have a strong and sweet aromatic odour resembling camphor.

Acharya Charakhas introduced it as Hikka, Shwas, Parshwa Shulaha rain Agrayasangraha which reflects its clinical efficacy. This plant is also explored for various activities like anti-oxidant, anti-microbial, antimutagenic and antiapoptotic effects, adaptogenic activity, mast cell stabilizing activity, cardioprotective activity, analgesic activity etc.

Pushkarmool (Inula racemosa), a medicinally important plant widely used in traditional systems of medicine, is frequently subjected to adulteration in commercial markets. This imbalance between demand and supply has created opportunities for raw drug traders to including adulteration and substitution. The administration of adulterated or substituted drugs introduces significant therapeutic variability and unpredictability, thereby undermining the reliability of treatment outcomes. Hence, rigorous quality assurance of medicinal plant starting materials is imperative to ensure the reproducible efficacy and safety of Ayurvedic formulations.

### AIM

To perform Physicochemical, Phytochemical and HPTLC study of Pushkarmoola (Inula racemosa Hook.f.) root.

### OBJECTIVE

1. To determine physicochemical parameter of Pushkarmoola (Inula racemosa Hook.f.) root.

2. To determine preliminary phytochemical parameters of Pushkarmoola (*Inula racemosa*Hook.f.) root.
3. To determine High Performance of Thin Layer Chromatography (HPTLC) of Pushkarmoola (*Inula racemosa*Hook.f.) root.

## II. MATERIAL AND METHODS

Dried Pushkarmoola roots were collected from LahulSpiti, Himachal Pradesh (Altitude: 3000 to 4000 meters and North Latitude: 31°44'57" and 32°59' 57"). Roots were subjected to powder form of 80 mesh size in controlled environment and stored in airtight containers. Preliminary Phytochemical analysis of root was performed at Pharmacognosy Laboratory of Upgraded Department of Dravyaguna, GAC, Vadodara. Physicochemical analysis and HPTLC were performed at pioneer pharmacy college, Vadodara.

### 1. Physicochemical Parameters

Assessment of the parameters such as pH, loss on drying, ash value, acid insoluble ash, water soluble extractive and alcohol soluble extractive was carried out by following the standard procedure recommended by Ayurvedic Pharmacopoeia of India. Detailed outcome of physicochemical parameters is given in table no. 3.

### 2. Preliminary Phytochemical analysis of Root:

By performing various qualitative tests, one can get idea about the type of Phyto constituents present in the sample. Hence the powder of samples subjected for following tests. Preparation of plant extracts is as per shown in below table no. 5.

**Table No.4: Steps for preparation of Plant extracts**

Step 1	Samples of powder taken 5 gm and was extracted with methanol (100ml).
Step 2	Kept it for overnight. Initially occasional shaking up to 6 hours was performed and then kept aside for settle down.
Step 3	After 24 hours, it was filtered and alcoholic extract was collected
Step 4	Similarly, water extracts of sample were prepared and collected
Step 5	After that, qualitative tests were done by using appropriate extracts

Phytochemical analysis was performed with following the standard protocol given in API. As like - Alkaloid - Dragendorff's reagent, Saponin - Foam test, Flavonoids, Tannin, Steroids. Observations are mentioned in table no.5. and plate no 1.

### 3. Sophisticated Analysis:

HPTLC is a sophisticated and automated technique, which is useful in separation of compounds. Pre-coated plates and auto sampler are used for precision and to achieve significant separation. UV, visible and fluorescence scanner are used for qualitative and quantitative estimation.

**Preparation of Test Solution:** Weight approximately 5gm of sample in conical flask. To it 100ml of methanol was added and cold macerated for 24hrs. On completion of time, it was filtered with the help of whatmann no.1 filter paper and use this test solution for HPTLC finger printing.

**Preparation of Spray reagent [vanillin – sulphuric acid reagent]:** 1gm of vanillin added with 2ml of sulphuric acid was dissolved in 100ml of 95% ethanol.

HPTLC of Pushkarmoola (*Inularacemosa*Hook.f.) root was scanned under 254nm, 366 nm and 540nm. Observation of R<sub>f</sub> value and number of spots at different visualization tabulated in table no.6. plate no. 2

## III. RESULTS AND DISCUSSION:

In the present study, standardization of root of Pushkarmoola (*Inularacemosa*Hook.f.) was done which included physicochemical phytochemical analysis and HPTLC. This provides the easy, speedy and economical means to establish the identity and purity of drug and it also provides a reliable method for identifying adulteration.

Physicochemical evaluation of the plant material was carried out to assess its purity, quality, and identity. The total-ash value was found to be 2.90%, indicating a normal level of inorganic content and minimal extraneous earthy matter. The acid-insoluble ash was 0.32%, reflecting low siliceous contamination such as sand or silica, which suggests proper post-harvesting handling. The loss on drying was recorded as 9.50%, signifying moderate moisture content; this value is within acceptable limits, reducing the likelihood of microbial proliferation such as bacteria or fungi

during storage. The water-soluble extractive value was 42.6%, suggesting the presence of a significant proportion of polar constituents, while the alcohol-soluble extractive value measured 17.6%, indicating a moderate level of alcohol-soluble phytochemicals. These extractive values demonstrate the presence of the expected phytoconstituents and are useful indicators for

detecting exhausted or adulterated samples. The pH of the aqueous extract was 6.43%, which falls within the normal acidic range reported for many herbal drugs, supporting its stability and palatability. The obtained values comply with the standard ranges prescribed in the Ayurvedic Pharmacopoeia.

**Table No. 3: Values of Physicochemical Parameters of Pushkarmoola (*Inula racemosa* Hook.f.) root**

Physicochemical Parameter	Results	Limit as per Ayurvedic Pharmacopoeia of India
Loss on drying(% w/w)	9.50%	Not Applicable
Total Ash value(% w/w)	2.90%	Not more than 5.0%
Acid insoluble ash(% w/w)	0.32%	Not more than 0.6%
Water soluble extractive value(% w/w)	42.6%	Not less than 20.0%
Alcohol soluble extractive value(% w/w)	17.6%	Not less than 10.0%
pH (1% Solution)	6.43	Not Applicable

The chemical constituents of plants/herbs contribute to their physiological properties and consist of primary metabolites, viz., sugars, amino acids, and proteins, along with secondary metabolites such as alkaloids, flavonoids, tannins, saponin, steroids etc. In the present study, different

qualitative tests were carried out with the methanol extracts of the *Inula racemosa* Hook.f. root powder. The results of the phytochemical screening revealed the presence of alkaloids, saponins, tannins, and flavonoids but absence of steroids in the extracts of this the sample.

**Table No. 5: Result of Preliminary Qualitative tests of Pushkarmoola (*Inula racemosa* Hook.f.) root**

Plant Metabolites	Results
Alkaloid	+ve
Saponin	-ve
Flavonoids	+ve
Tannin	+ve
Steroids	+ve

In HPTLC profile, each and every metabolite has played specific role and function in harmony with other metabolites within the organization framework of the cells in the defence mechanism of the plants. Here in this HPTLC study different peaks are observed at different R<sub>f</sub>. Total 2

peaks are observed at 254nm, and 3 peaks are observed at 366nm and 7 peaks are observed at 540nm of UV light. The number of observed peaks shows the presence of numerous active constituents in the given sample of the root of Pushkarmoola (*Inula racemosa* Hook.f.).

**Table No. 6: Observation of R<sub>f</sub> value and number of spots at different visualization**

Visualization	R <sub>f</sub> Value	Number of Spots
254 nm	0.55, 0.87	2
366 nm	0.19, 0.84, 0.90	3
540 nm	0.14, 0.25, 0.31, 0.55, 0.68, 0.88, 0.90	7

#### IV. CONCLUSION

Pushkarmoola (*Inula racemosa* Hook.f.) is an important plant which is used in many formulations and various diseases conditions

mentioned in Ayurvedic literature. This study shows the Phytochemical analysis, Physicochemical and HPTLC parameters that can be used for the identification in further research study.

**PlateNo.1:PhotoofPhytochemical analysis of Pushkarmoola(*Inula racemosa*Hook.F) root powder**



Fig.1 a: *Pushkarmoola*(*Inula racemosa* Hook.F) root powder

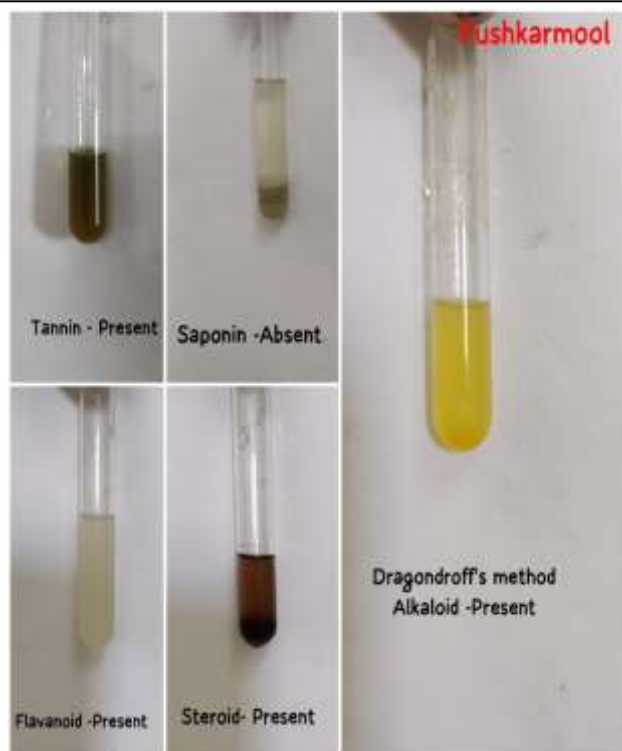
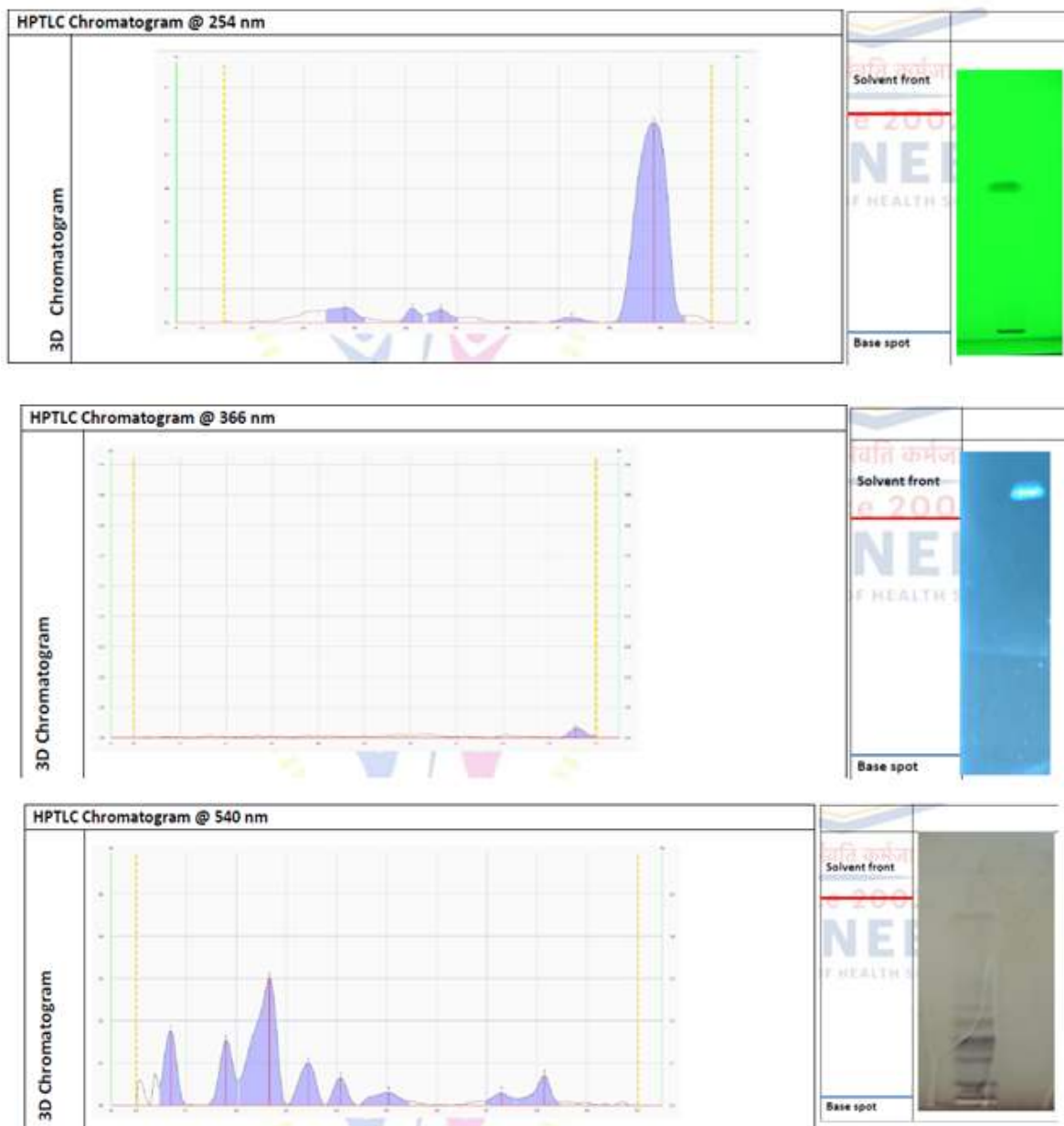


Fig.1 b: **Phytochemical analysis of *Pushkarmoola*(*Inula racemosa* Hook.F) root powder**

PlateNo.2:PhotoofHPTLC analysis ofPushkarmoola(*Inula racemosa*Hook.F) root powder



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