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PHARMACOGNOSTICAL, PHYSICOCHEMICAL AND CHROMATOGRAPHIC STANDARDIZATION OF *MUKHAKANTIKARA LEPA*: AN AYURVEDIC POLYHERBAL FORMULATION

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ABSTRACT

Introduction: *Vyanga*, a *Kshudra Roga* characterized by painless facial hyperpigmentation, is associated with *Vata-Pitta* vitiation and *Rakta Dushti* and can be correlated with melasma. *Mukhakantikara Lepa* is a classical polyherbal formulation known for its *Varnya* and *Twachya* properties and is indicated for the management of *Vyanga*. **Aim and Objective**: To standardize *Mukhakantikara Lepa* by authenticating its ingredients and establishing pharmacognostical and physicochemical quality control parameters. **Material and Methods**: The formulation was prepared using equal proportions of *Raktachandana, Manjistha, Lodhra, Kushtha, Priyangu, Vatankura, and Masoora.* Organoleptic evaluation, powder microscopy, physicochemical analysis, and TLC profiling were carried out. **Results:** The prepared formulation was found to be reddish-brown in colour with an aromatic odour, fine texture and astringent taste. Microscopic evaluation revealed the presence of characteristic cellular structures corresponding to all ingredients used in the formulation. Physicochemical analysis showed loss on drying (2.67 ± 0.08%), total ash (13.94 ± 0.12%), water-soluble extractive (16.61 ± 0.15%), methanol-soluble extractive (29.34 ± 0.21%) and

pH (6.50 ± 0.05). Thin layer chromatographic analysis exhibited five spots at 254 nm and nine spots at 366 nm, indicating the presence of multiple phytochemical constituents. **Discussion and Conclusion:** The study established the characteristic pharmacognostical, physicochemical and chromatographic features of *Mukhakantikara Lepa.* The findings support its quality, authenticity and suitability for further pharmaceutical and clinical investigations.

KEYWORDS: *Vyanga*, Melasma, *Mukhakantikara Lepa*, Pharmacognostical Evaluation, Thin Layer Chromatography.

INTRODUCTION

Vyanga is one among the *Kshudra Rogas*[1] described in Ayurvedic classics and is characterized by the appearance of painless, bluish-black or brownish discoloration over the face due to the vitiation of *Vata* and *Pitta Dosha* along with *Rakta Dushti*. It closely resembles melasma described in contemporary medicine, which is a common acquired hyperpigmentation disorder affecting facial aesthetics and may quality of life too. Although various therapeutic approaches are available, the recurrence and adverse effects associated with prolonged use of chemical agents have led to an increased interest in herbal formulations. *Lepa Kalpana* is an important external therapeutic measure advocated in Ayurveda for the management of skin disorders. *Mukhakantikara Lepa*[2] is a polyherbal formulation comprising *Raktachandana*, *Manjistha*, *Lodhra*, *Kushtha*, *Priyangu*, *Vatankura* and Masoor in equal proportions. Most of these ingredients possess *Varnya* (Improves skin complexion), *Raktaprasadana* (blood-purifying), *Twachya* (promotes skin health) and *Pitta-Shamaka* properties, making the formulation suitable for the management of *Vyanga*. Standardization and quality evaluation of the formulation through pharmacognostical and physicochemical studies are essential for ensuring its authenticity, purity and reproducibility. Hence, the present study was undertaken to establish pharmacognostical and pharmaceutical standards for *Mukhakantikara Lepa*.

MATERIAL AND METHOD

Collection of drugs: Raw herbs of *Mukhakantikara Lepa* (Table-1) i.e. *Raktachandana*, *Manjistha*, *Lodhra*, *Kushtha*, *Priyangu* were collected from the institute Pharmacy, *Vatankura* and *Masoora* were procured from local market and authenticated in pharmacognosy laboratory, ITRA, Jamnagar.

Table No. 1: Ingredients of *Mukhakantikara Lepa*.

Sr.no	Name of ingredients	Latin name	Part used	Proportion
1	*Raktachandana*	Petrocarpus santalinus Linn. L f.	Heartwood	1 part
2	*Manjishtha*	Rubia cordifolia Linn.	Root	1 part
3	*Lodhra*	Symplocos racemosa Roxb.	Bark	1 part
4	*Kushtha*	Saussurea lappa C.B. Clarke.	Root	1 part
5	*Priyangu*	Callicarpa macrophylla Vahl	Flower	1 part
6	*Vatankura*	Ficus bengalensis Linn.	Leaf bud	1 part
7	*Masoora*	Lens culinaris Medic.	Seed	1 part

Preparation of *Mukhakantikara Lepa*

Completely dried raw drugs (Table No 1) collected, made its powder and then mixed homogenously to form mixture. The powder was prepared in the Pharmacy of Gujarat Ayurveda University Jamnagar, following Standard operative procedures adopted by the Pharmacy. The finished product was stored in air tight containers and kept in a dry place at room temperature.

Pharmacognostical evaluation

As per Ayurvedic Pharmacopeia of India, 7 raw drugs were identified and authenticated by the Pharmacognosy Lab, ITRA Jamnagar. The identification was carried out based on the organoleptic features and powder microscopy of the finished product. Later, Pharmacognostical evaluation of *Mukhakantikara Lepa* was carried out. *Mukhakantikara Lepa* dissolved in small quantity of distilled water, studied under the Carl Zeiss trinocular microscope attached with camera, with stain and without stain.[3] The microphotographs were also taken under the microscope.

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 the laboratory.[4]

Physico-chemical analysis

Physicochemical analysis of *Mukhakantikara Lepa* was conducted at the Pharmaceutical Laboratory of the Institute to develop preliminary analytical profiles. The analysis was carried out in accordance with the physicochemical parameters as specified in API. Parameters assessed included loss on drying, water-soluble extractive, alcohol soluble extractive, Total Ash, Acid insoluble ash and pH. All physicochemical analyses were

performed in triplicate and the results were expressed as Mean ± Standard Deviation (SD).

a) Loss on drying

Loss on drying was determined by accurately weighing the powdered samples of *Mukhakantikara Lepa* and drying it in hot air oven at 105 ºC until constant weight was obtained.[5]

b) Water-soluble extractive value

About 5 g of the powdered drug was macerated with 100 mL of distilled water and kept for 24 hours, with occasional shaking during the first 6 hours. The mixture was then filtered, and 25 mL of the filtrate was evaporated to dryness in a previously weighed dish. The water-soluble extractive value was then calculated and expressed as a percentage.[6]

c) Alcohol-soluble extractive value

In 100 ml alcohol 5 gm powdered drug was added and macerated for 24 hours with occasional shaking during first six hours. Then filtered and 25 ml of filtrate was evaporated and dried. The percentage of alcohol-soluble extractive value was calculated.[7]

d) Total ash

Accurately weighed powdered sample of *Mukhakantikara Lepa Churna* was taken in previously weighed crucible then placed in muffle furnace for ignition at 450 ºC until carbon free ash was obtained.[8]

e) **Acid insoluble ash**

The total ash obtained was boiled with 6N hydrochloric acid, filtered and washed with distilled water until becomes chloride free using ashless filter paper. The residue was incinerated, cooled and weighed.[9]

f) pH

10% aqueous solution of the powdered drug was prepared then pH was measured at room temperature by using a calibrated digital pH meter.[10]

Thin Layer Chromatography TLC[11]

Thin Layer Chromatography (TLC) of *Mukhakantikara Lepa* was performed using precoated silica gel 60 F254 plates. The sample was developed in a solvent system consisting of Toluene: Ethyl acetate: Methanol: Formic acid (6:3:1:0.1). After development up to a solvent

front of 8.5 cm, the plate was dried and observed under UV light at 254 nm and 366 nm. The Rf values of the resolved spots were calculated and recorded.

OBSERVATION AND RESULT

Organoleptic Character

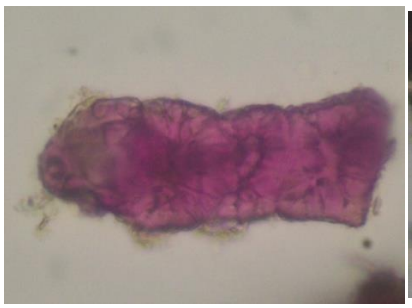
Organoleptic parameters like Colour, odour, taste and touch were scientifically studied and results are depicted in the Table 2.

Table no. 2: Organoleptic characteristics of *Mukhakantikara Lepa.*

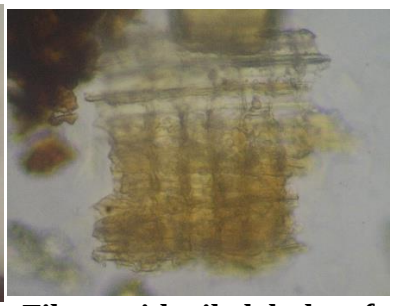
Sr.no	Character	Result
1	Colour	Reddish brown
2	Odour	Aromatic
3	Touch	Fine powder
4	Taste	Astringent

Microscopic characters

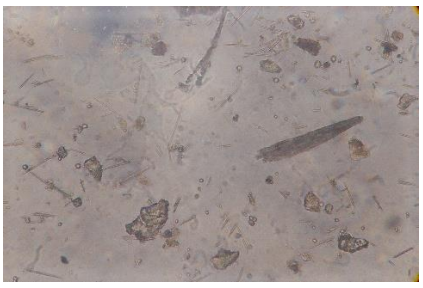
Microscopic characters of *Mukhakantikara Lepa* are as shown in Figure 1. The pharmacognostical study reveals the presence acicular crystals and stone cells of *Manjishtha*, Crystals, fibers and Starch grains of *Vatankura*, Parenchymal cells ,fibers with oil globules and stone cells of *Raktachandana*, Lignified fibers of *Kushtha*, Rhomboidal crystals and Lignified fibers of *Lodhra*, Parenchymal cells embedded with aleurone grains, prismatic crystals, simple fiber of Priyangu, Parenchymal cells with starch grains of masoor, pitted stone of *Kushtha*, Pitted vessels of *Kushtha*.



Stone cells of *Raktachandana*

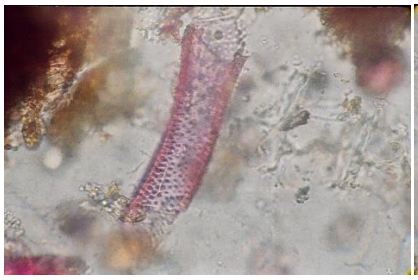


Fibers with oil globules of *Raktachandana*

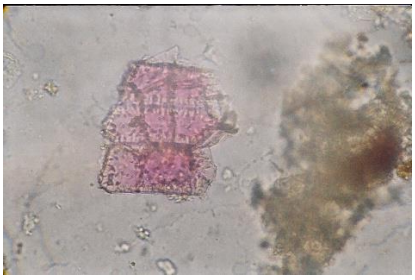


Acicular crystals of *Manjishtha*

Stone cells of *Manjishtha*

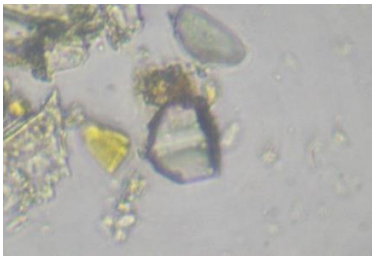


Pitted vessel of *Kushtha*

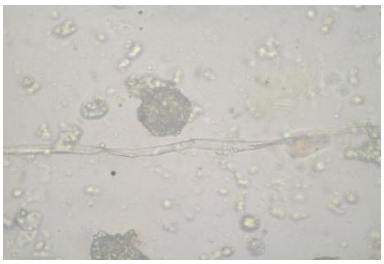


Pitted stone of Kushtha

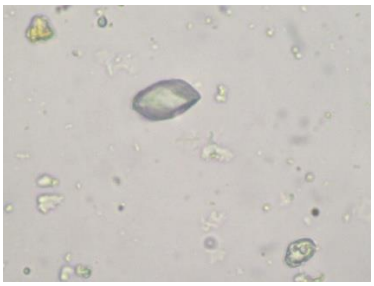
Lignified Fiber of *Lodhra*



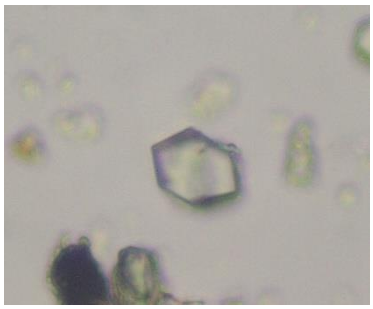
Rhomboidal crystal of *Lodhra*



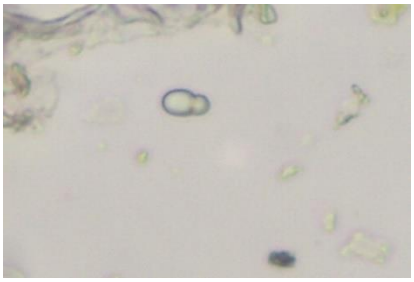
Simple fibre of *Priyangu*



Prismatic crystals of *Priyangu*

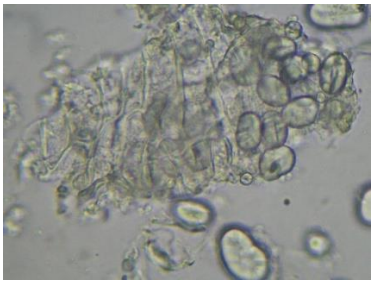


Crsytals of *Vatankur*

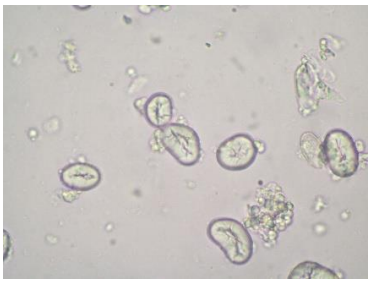


Starchgrains of *Vatankur*

Fiber of *Vatankur*



Parenchyma cells with starchgrains of *Masoor*



Starch grains of *Vatankur*

Figure 1: Microscopic character of *Mukhakantikara Lepa*.

Physico - chemical Analysis

The physicochemical parameters of *Mukhakantikara Lepa* were evaluated and expressed as Mean ± SD (n = 3). The loss on drying value was found to be **2.67 ± 0.08%**, indicating low moisture content, which is favourable for stability and shelf life of the formulation. The total ash value was **13.94 ± 0.12%**, reflecting the organic and mineral constituents naturally present in the ingredients. The water-soluble extractive value (**16.61 ± 0.15%**) and alcohol-soluble extractive value (**29.34 ± 0.21%**) indicated the presence of appreciable quantities of water-soluble and alcohol-soluble phytoconstituents, respectively. The comparatively higher methanol-soluble extractive value suggests better solubility of phytochemicals in methanol. The pH of the formulation (**6.50 ± 0.05**) was found to be near neutral, indicating suitability for topical application on facial skin without causing significant irritation.

Table 3: Physicochemical Parameters of *Mukhakantikara Lepa* (Mean ± SD, n=3).

Sr. No.	Test	Mean ± SD, n=3
1	Loss on Drying	2.67 ± 0.08
2	Ash Value	13.94 ± 0.12
3	Water soluble extract	16.61 ± 0.15
4	Alcohol soluble extract	29.34 ± 0.21
5	pH	6.5 ± 0.05

Thin Layer Chromatographic Study

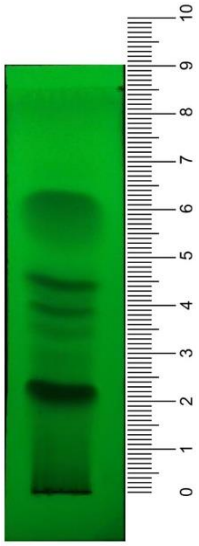
Thin Layer Chromatographic (TLC) analysis of *Mukhakantikara Lepa* generated a characteristic chromatographic fingerprint profile under both UV wavelengths (Figure 2 and Figure 3). At 254 nm, five well-resolved spots were observed with Rf values of 0.20, 0.30, 0.43, 0.54 and 0.76. Under 366 nm, nine fluorescent spots were detected at Rf values of 0.22, 0.29, 0.38, 0.43, 0.51, 0.56, 0.61, 0.69 and 0.84.

The greater number of spots observed under 366 nm compared to 254 nm indicates the presence of fluorescent phytoconstituents in the formulation. The common band observed around Rf 0.43 under both wavelengths may represent a major phytoconstituent detectable under different UV conditions. The diversity of spots obtained reflects the polyherbal nature of the formulation and suggests the presence of multiple classes of bioactive compounds such as phenolics, flavonoids, tannins and other secondary metabolites contributed by ingredients.

The TLC fingerprint profile obtained in the present study may serve as a valuable reference standard for identification, authentication, batch-to-batch consistency and quality control of Mukhakantikara Lepa. The chromatographic images recorded at 254 nm and 366 nm further support the reproducibility and standardization of the formulation.

Table No. 4: Chromatographic Fingerprinting of *Mukhakantikara Lepa.*

Wavelength	Spots	Rf Value
At 254 nm	5	0.20, 0.30, 0.43, 0.54, 0.76
At 366 nm	9	0.22, 0.29, 0.38, 0.43, 0.51, 0.56, 0.61, 0.69, 0.84



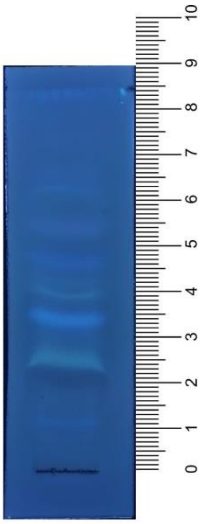


Fig.2: TLC fingerprinting 254nm. Fig.3: TLC fingerprinting 366nm.

DISCUSSION

Mukhakantikara Lepa is a classical polyherbal formulation indicated for the management of *Vyanga* owing to its *Varnya*, *Twachya* and *Rakta-prasadana* properties. In the present study, pharmacognostical and physicochemical evaluations were undertaken to establish the identity, purity and quality attributes of the formulation.

Organoleptic examination revealed that the formulation possesses a characteristic reddish-brown colour, aromatic odour, fine powder consistency and a predominantly astringent taste. These sensory attributes may be attributed to the collective contribution of ingredients such as *Raktachandana*, *Manjistha*, *Lodhra* and *Priyangu*, which are rich in tannins, colouring principles and aromatic constituents.

Microscopic evaluation demonstrated several diagnostic characters including stone cells, acicular crystals, pitted vessels, lignified fibres, starch grains and prismatic crystals. The presence of these characteristic structures corresponding to the individual ingredients confirms the authenticity of the raw materials employed in the formulation and indicates the absence of apparent adulteration or substitution.

The physicochemical parameters were determined and expressed as Mean ± SD (n = 3). The loss on drying value (**2.67 ± 0.08%**) indicates low moisture content, which may contribute to enhanced stability and reduced susceptibility to microbial deterioration during storage. The total ash value (**13.94 ± 0.12%**) reflects the natural organic and mineral content of the constituent drugs. The water-soluble extractive value (**16.61 ± 0.15%**) and methanol-soluble

extractive value (**29.34 ± 0.21%**) suggest the presence of substantial quantities of water-soluble and alcohol-soluble phytoconstituents, respectively. The comparatively higher methanol-soluble extractive value indicates a greater abundance of semi-polar and polar bioactive constituent's extractable in methanol. The pH value (**6.50 ± 0.05**) was found to be near neutral, indicating suitability of the formulation for topical application on the skin.

CONCLUSION

Pharmacognostical and Phyto-chemical evaluation of *Mukhakantikara Lepa* illustrated the specific characters of ingredients which were used in the preparation. Physicochemical profile is an essential parameter for quality assurance; in present work the obtained results were found within prescribed limits. On the basis of observations and experimental results, this study may be used as reference standard in the further quality control researches.

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