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Research Article

PHARMACEUTICO-ANALYTICAL STUDY OF *KARANJADI LEPA* AND ITS MODIFIED DUSTING POWDER

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ABSTRACT

Skin diseases are among the most prevalent health problems worldwide and are influenced by lifestyle changes, environmental pollution, poor dietary habits, and inadequate personal hygiene. *Lepa Kalpana*, one of the *Bahiparimarjana Chikitsa* described in Ayurveda, involves the external application of medicated herbal pastes for the management of various dermatological conditions. *Karanjadi Lepa*, described in *Charaka Samhita* for the treatment of *Kushta*, has limitations such as inconvenience in preparation, difficulty in application, staining of clothes, and limited shelf life. Therefore, the present study aimed to develop a modified dusting powder dosage form of *Karanjadi Lepa* and evaluate its pharmaceutical quality. *Karanjadi Lepa* dusting powder was prepared by modifying the classical formulation using suitable pharmaceutical techniques. Comparative evaluation of the conventional *Lepa* and the modified dusting powder was carried out through organoleptic assessment, physicochemical analysis, including bulk density, tap density, flow properties, pH, loss on drying, ash values, and Thin Layer Chromatography (TLC) fingerprinting of alcohol-soluble and water-soluble extracts. The modified dusting powder exhibited improved organoleptic characteristics with a soft texture, very fine consistency, and pleasant odour. Physicochemical evaluation demonstrated acceptable pharmaceutical properties, while Thin Layer Chromatography analysis revealed comparable chromatographic profiles between the conventional *Lepa* and the dusting powder, indicating preservation of the major phytochemical constituents without significant alteration during formulation modification. The conversion of *Karanjadi Lepa* into a dusting powder successfully retained the physicochemical quality and phytochemical integrity of the classical formulation while improving convenience, portability, storage stability, and patient acceptability. The modified dosage form may serve as a promising alternative topical formulation for dermatological disorders, although further pharmacological and clinical studies are warranted to establish its therapeutic efficacy.

INTRODUCTION

The word *'Bheshaja'* or *'Bhaishajya'* literally means *Aushadha* (medicine). It is that which eliminates fear of disease or restores a person's health by balancing the *Doshas*. The term *Kalpana* refers to the process or method used to prepare pharmaceutical products. The *"Bhaishajya Kalpana"* is a science that delves into the preparation of various medicines.

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Drugs are the names given to therapeutic agents. To enable therapeutics, the drugs must be processed in some way. This can be accomplished with the help of basic fundamental preparations known as *"Panchavidha Kashaya Kalpana"* i.e., *Swarasa, Kalka, Kwatha, Hima,* and *Phanta*. Many other *Kalpanas* are mentioned, including *Churna, Avaleha, Sneha, Vati*, *Lepa, Mashi, Lavana, Malahara*, and others. To cause a change in the medication's attributes or properties, either by inducing a new property or improving an existing one, resulting in a safer and more effective medicine. *Panchavidha Kashaya Kalpana* refers to the basic operations involved in the drug modification process. Following this, several other formulations

were created to attain ready palatability, quick action, easy dispensing-handling, extended shelf life and low dose.[1] There are more than 30 *Kalpanas* that physicians employ on a regular basis.

Lepa Kalpana is one among the *Kalpana* where wet medicinal drugs are made in paste form, if the drugs are in dry state, then they are converted into paste form by adding little quantity of water and grinding. This paste is used as an external application and is called *Lepa Kalpana*. From pharmaceutical point of view *Lepa Kalpana* is a form of *Kalka Kalpana*. [2]

Ayurvedic literature has not furnished complete details of *Lepa Kalpana* in a single chapter. Therefore, one must depend upon the scattered references to understand the concepts of *Lepa Kalpana* clearly. Acharya Charaka has described formulations for external application in *'Aragwadhiya Adhaya'* but neither he himself nor commentator Chakrapani touched the various pharmaceutical aspects of *Lepa Kalpana*. Dermatological conditions, medicinal powders are utilized as external therapies in forms such as *Pradeha, Pralepa, Alepa, Udwartana*, and *Udsadana* etc. Nevertheless, using these powders can cause discomfort and pain in certain skin conditions, and the duration for which the medication remains in contact with the target area may vary or be insufficient. Given today's fast-paced lifestyle, there is a need for a convenient dosage considering patient's compliance. [3]

Karanjadi lepa is a formulation mentioned in Charaka Samhita, Sutrasthana in the context of *Kushta chikitsa*. In present time, the difficulty in preparation, application, staining and shelf life of *Lepa* is a great challenge. Hence there is a need for modification of *Lepa* into a newer dosage form, as dusting powder which will be convenient for the patient to use.

Dusting powders are powders in fine state of subdivision that can be used for external application to areas where skin is intact. Dusting powders should be homogenous and in a very fine state of subdivision to enhance the effectiveness of the medicament and minimize the local irritation. Hence dusting powder should be passed through sieve no. 120 or 180, to get very fine powder.

Dusting powder should have: Free flowability, easy spreadability, non–irritability, non-grittiness, good absorption and adsorption, compatible with skin secretions. [4]

Dusting powders must be able to protect the skin from irritation, caused by friction moisture and chemical irritations. In dusting powders along with medicament, other ingredients like adsorbents and lubricants are also incorporated, to adsorb the watery portion of the wounds and get sticks on the applied part of the body and enhance the spreadability or flow property, to make powder to flow easily, on the affected part.

So, an attempt is made to prepare *Karanjadi Lepa* in *Churna* form and pharmaceutically modify it into dusting powder and to study its physico-chemical parameters analytically and compare its results.

AIMS AND OBJECTIVES

1. To prepare *Karanjadi Lepa* as per the classics.
2. To modify *Karanjadi Lepa* into dusting powder as per pharmaceutical standards.
3. To analyze *Karanjadi lepa* and its modified Dusting powder organoleptically and physico-chemically.

METHODOLOGY

Table 1: Materials and methods described under the following heading

S.No.	Study Section	Sub-division
1.	Pharmaceutical Study	• Collection of raw drugs • Authentication of raw drugs • Pharmaceutical processing ➢ Preparation of *Churna* of each raw drug ➢ Bhavana with *Gomutra* ➢ Preparation of *Karanjadi Lepa* ➢ Modification of *Karanjadi lepa* to dusting powder
2.	Analytical Study[5]	**Organoleptic Parameters** • Colour • Odor • Taste • Touch

		Physical parameters • Particle size determination • Bulk Density • Tap Density • Carr's Index • Haurner Ratio **Chemical parameters** • Loss on drying at 105°C • Total ash • Acid insoluble ash • Water soluble ash • Water soluble extractive • pH • Thin Layer Chromatography

Pharmaceutical Study

It includes

1. Pharmaceutical study of *Karanjadi Lepa.*
2. Pharmaceutical modification of *Karanjadi Lepa* into dusting powder.

Pharmaceutical Study of *Karanjadi Lepa*

Collection of Raw Drugs

- For the preparation of *Karanjadi lepa* all the raw drugs required such as *Karanja beeja, Kushta* and *Chakramarda beeja* were procured from Rajan Herbs, Haridwar.
- Fresh *Gomutra* was collected for *Bhavana* from the local farmers.

Authentication of raw drugs

As per organoleptic characters the raw drugs for the preparation of *Karanjadi Lepa* were verified and authenticated from the Department of Dravyaguna, Rohilkhand Ayurveda College and Hospital, Bareilly, as per API standards.

Table 2: Ingredients for the preparation of *Karanjadi Lepa*

S.No.	Drug Name	Botanical Name	Family	Useful part	Quantity taken
1.	*Karanja* [6]	*Pongamia pinnata Linn.*	Leguminosae	*Beeja* (seeds)	250 gm
2.	*Kustha* [7]	*Saussurealappa*	Compositae	*Moola* (roots)	250 gm
3.	*Chakramarda*[8]	*Cassiatorra*	Leguminosae	*Beeja* (seeds)	250 gm

Bhavana Dravya: Gomutra[9]

Preparation of *Karanjadi Lepa*

The entire preparation of *Karanjadi Lepa* was carried out in the Teaching Pharmacy of Department Rasashastra and Bhaishajya Kalpana at RAMCH, Bareilly.

Method/Principle: Pounding, sieving, mixing, *Bhavana*

Apparatus used: *Khalwayantra*, stainless steel vessel, sieve no: 85, cloth, spoon

Procedure

- 250gm of each raw drug was taken in a clean and dry *Khalwa yantra* and pounded separately and sieved through Sieve no: 85 and obtained fine powder, then packed in airtight containers.
- Equal quantity of all the above *Churna* were taken in a stainless-steel vessel and mixed thoroughly through the process of spatulation.
- After mixing thoroughly, powders were subjected to bhavana with *Gomutra* for 3 hours continuously and subjected to air dry.
- The dried material is again powdered and sieved through sieve no: 85 to get the fine powder form.

Packing and preservation

Karanjadi lepa Churna was packed and preserved in airtight sifted plastic bottles of 30gm size.

Pharmaceutical Modification of *Karanjadi Lepa* into Dusting Powder

Collection of chemical ingredients

All the chemicals for the preparation of dusting powder were purchased from the chemical shop from the local market at Bareilly.

Table 3: Ingredients and proportions for preparation of *Karanjadi Lepa* Dusting Powder

S.No.	Name of ingredients	Quantity taken
1.	*Karanjadi Lepa Churna*	50gm
2.	Purified Talc	50gm
3.	Starch in powder	25gm
4.	Zinc Oxide in powder	20gm
5.	Saliicylic Acid in powder	5gm

Preparation of *Karanjadi Lepa* Dusting Powder: The entire preparation of *Karanjadi Lepa* dusting powder was carried out in the Teaching Pharmacy in Department Rasashastra and Bhaishajya Kalpana at Rohilkhand Ayurvedic Medical College and Hospital, Bareilly.

Method/Principle: Pounding, sieving, mixing

Apparatus used: *Khalwayantra*, stainless steel vessels, sieve no: 120, cloth, spatula

Procedure

- All the ingredients in the above-mentioned quantity were weighed and kept separately in a stainless-steel vessel.
- Then each one of the ingredients were transferred to a porcelain *Khalwa yantra* and triturated well till it becomes thoroughly mixed.
- After trituration it was sieved through a sieve no: 120 to obtain a very fine powder form and obtained product is *Karanjadi lepa* dusting powder.

Packing and Preservation

- *Karanjadi Lepa* dusting powder was then packed and stored in clean and dry airtight sifted plastic containers of 30gm size.

Analytical Study

Analytical studies can be grouped into several categories by process and purpose, from which the underlined studies are recommended specifically for *Churna* as recommended originally in the Ayurvedic Pharmacopoeia of India. It was done under the four headings as given below:

Organoleptic characteristics

Assessment of organoleptic characteristics of the *Karanjadi Lepa* and its modified dusting powder.

Physical analysis of the *Karanjadi Lepa* and its modified Dusting powder

- Particle size determination
- Bulk density
- Tap density
- Calculation of Carr's Index/Compressibility Index and
- Hausner's Ratio
- Free flowing property (Angle of Repose)

Chemical quantitative analyses of *Karanjadi Lepa* and its modified Dusting powder

- Loss on drying at 105°C
- Total Ash
- Acid insoluble ash
- Water soluble ash
- pH
- Alcohol soluble extractive
- Water soluble extractive

Chromatographic studies: Thin Layer Chromatography (TLC) [10]

Following analytical tests were done in the Quality Control Laboratory of Department of Rasashastra and Bhaishajya Kalpana, Rohilkhand Ayurvedic Medical College and Hospital, Bareilly.

Observation and Results of Pharmaceutico-Analytical Study

Organoleptic Parameters

Parameter	*Karanjadi Lepa*	*Karanjadi Lepa* Dusting Powder
Colour	Dark brown	Greyish white
Odour	Smell of *Gomutra*	Pleasant smell of ingredients
Taste	Not done	Not done
Touch	Rough	Soft
Consistency	Fine powder	Very fine powder

Physico-chemical Analysis

Parameter	**Unit**	***Karanjadi Lepa* (KL)**	***Karanjadi Lepa* Dusting Powder (KLDP)**
Mass	G	50.6	50.4
Bulk Volume	Ml	100	100
Bulk Density	g/Ml	0.51	0.50
Mass (Tap Density)	G	50.6	45.8
Tapped Volume	Ml	77	76
Tap Density	g/mL	0.657	0.603
Initial	mL	100	100
Volume			
Tapped Volume (Carr's Index)	mL	77	76
Carr's Index	%	23	24
Hausner Ratio	-	1.30	1.32
Angle of Repose	°	25	30
Loss on drying at 105°C	%	9.0	9.0
pH (25.5°C)	-	5.48	6.39
Residual Mass	G	0.129	0.110
Total Ash	% w/w	6.45	6.39
Acid Insoluble Ash	%	2.20	0.85
Water Soluble Ash	% w/w	18.52	22.48

Figures Depicting Preparation and Analytical Study



Chakramarda Beeja



Karanja Beeja



Kushta



Gomutra

Fig 1: Ingredients of *Karanjadi lepa*



Ingredients



Bhavana* Done in *Gomutra



Karanjadi Lepa Churna



***Karanjadi Lepa* Dusting Powder**

Fig 2: Procedure of preparation of *Karanjadi lepa*







Fig 3: Procedure of preparation of *Karanjadi lepa* Dusting Powder

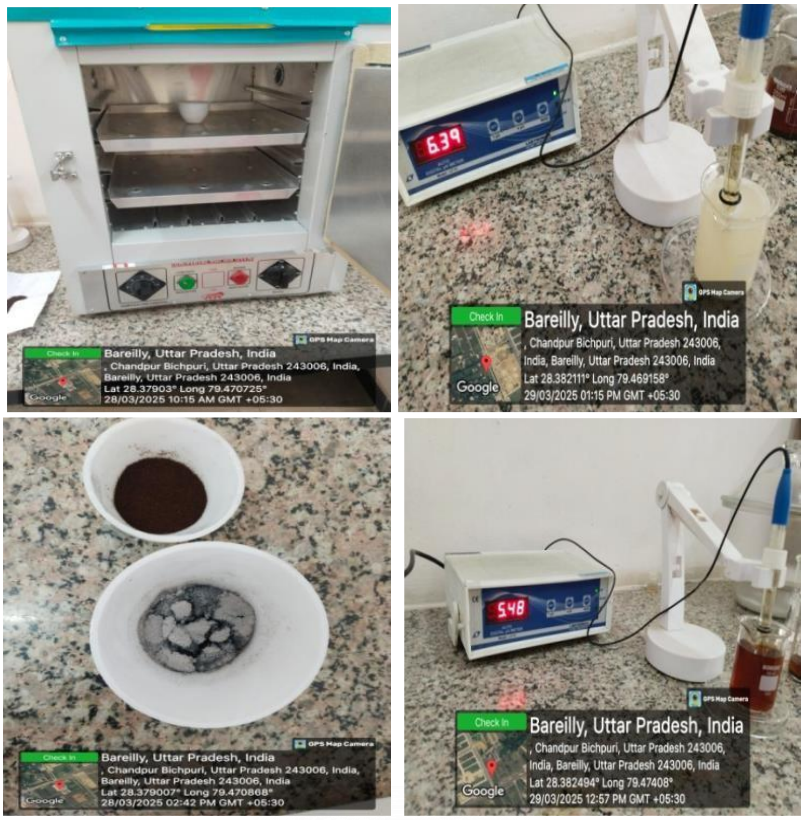


Fig 4: Analytical Study

DISCUSSION

The analytical evaluation demonstrated that the conversion of *Karanjadi Lepa* (KL) into *Karanjadi Lepa* Dusting Powder (KLDP) did not produce any major changes in its fundamental physicochemical characteristics, indicating that the modified formulation retained the quality attributes of the original preparation. The bulk density of both formulations was nearly identical, suggesting similar packing properties and ease of handling. Although the tap density of the dusting powder was slightly lower than that of the *Lepa*, it indicates a lighter and more porous powder, which may facilitate better spreading over the skin.

The flow properties of both formulations, as indicated by Carr's Index, Hausner ratio, and angle of repose, were within acceptable limits for topical powders. The slight increase in Carr's Index and Hausner ratio of KLDP does not significantly affect its pharmaceutical performance, while the angle of repose indicates that the dusting powder possesses satisfactory flowability for uniform dispensing and application.

The loss on drying was identical for both formulations, demonstrating that the modification process did not alter the moisture content. This suggests that the dusting powder is likely to possess comparable stability with minimal risk of microbial growth during storage. The pH of KLDP was slightly higher than that of the conventional *Lepa* and was closer to the physiological pH of the skin, which may improve skin compatibility and reduce the possibility of irritation during repeated application.

The total ash values of both formulations were almost identical, indicating that the inorganic constituents were preserved during formulation modification. However, the acid-insoluble ash value was considerably lower in the dusting powder, suggesting reduced contamination with siliceous or extraneous inorganic matter and reflecting improved pharmaceutical purity. Furthermore, the higher water-soluble ash value observed in KLDP indicates a greater proportion of water-soluble inorganic constituents, which may facilitate better interaction with skin moisture and enhance the availability of active components at the site of application.

The TLC profiles of the alcohol-soluble and water-soluble extracts of *Karanjadi Lepa* and *Karanjadi Lepa* dusting powder showed comparable chromatographic patterns with similar spots under UV light (365nm), indicating the presence of the same major phytochemical constituents. No additional or missing spots were observed in the modified formulation, suggesting that the process of converting the *Lepa* into a dusting powder did not alter its chemical composition. These findings confirm the phytochemical stability and chemical equivalence of the dusting powder formulation with the conventional *Karanjadi Lepa*.

Overall, the analytical findings suggest that the modification of *Karanjadi Lepa* into a dusting powder

successfully preserved the essential quality characteristics of the original formulation while improving certain pharmaceutical properties such as purity, skin compatibility, and ease of application.

Advantages of Modifying *Karanjadi Lepa* into Dusting Powder

The development of *Karanjadi Lepa* into a dusting powder offers several pharmaceutical and therapeutic advantages over the conventional formulation. The dusting powder is ready to use and eliminates the need for mixing with a liquid medium before application, thereby improving convenience and patient compliance. Its free-flowing nature allows uniform distribution over the affected area, ensuring better coverage, especially on irregular skin surfaces and body folds.

The dry nature of the formulation contributes to improved stability and a longer shelf life by minimizing moisture-related degradation and microbial contamination. The slightly alkaline pH, which is closer to the normal skin pH, may enhance patient comfort and reduce the likelihood of skin irritation during prolonged use. The lower acid-insoluble ash value reflects improved purity of the formulation, while the increased water-soluble ash value may facilitate better release of active constituents in the presence of skin moisture.

In addition, the dusting powder is more portable, easier to package, and more convenient to store and transport than the traditional *Lepa*. It is particularly suitable for dermatological conditions associated with moist lesions, excessive sweating, or fungal infections, where powders provide better moisture absorption and reduce friction. Collectively, these advantages indicate that *Karanjadi Lepa* dusting powder is a scientifically improved dosage form that maintains the therapeutic integrity of the original formulation while offering superior pharmaceutical elegance, patient acceptability, and practical utility.

CONCLUSION

The present study successfully developed and standardized *Karanjadi Lepa* dusting powder as a novel topical dosage form of the classical Ayurvedic formulation *Karanjadi Lepa*. The organoleptic evaluation demonstrated that the modified formulation possessed desirable characteristics, including a soft texture, very fine consistency, pleasant odour, and improved aesthetic appeal compared with the conventional *Lepa*. Physicochemical analysis revealed that the dusting powder retained the essential quality attributes of the original formulation, with acceptable bulk and tap densities, satisfactory flow properties, appropriate moisture content, and comparable ash values, indicating good pharmaceutical quality and stability.

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