

**A COMPARATIVE PHARMACEUTICO- ANALYTICAL AND IN VITRO ANTIFUNGAL
ACTIVITY OF KUSHTHADI LEPA AND IT'S OINTMENT**

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ABSTRACT

Kushthadi Lepa is a classical Ayurvedic topical formulation indicated in skin disorders. However, its paste form may have limitations related to application, handling, stability and patient acceptability. Therefore, present study was undertaken to develop an ointment form of Kushthadi Lepa and to compare the Pharmaceutical, Analytical and in-vitro Antifungal properties of both Lepa and Ointment. Kushthadi Lepa was prepared using six ingredients- Kushtha, Mulaka Beeja, Priyangu, Sarshapa, Haridra and Nagakeshara. Further Tila Taila was subjected to Murchana and subsequently used for preparation of Kushthadi Siddha Taila. The Siddha Taila was converted into ointment using Sikta (beewax). Both formulations were subjected to pharmaceutical and analytical evaluation. Also in-vitro Antifungal activity was assessed by the well diffusion method against selected fungal strains. The prepared formulations showed acceptable pharmaceutical characteristics and were evaluated for relevant physicochemical and Analytical parameters. The Ointment demonstrated improved ease of application and suitable consistency compared with the Lepa. Antifungal activity was observed against the selected fungal organisms, indicating the potential of Kushthadi formulation for topical antifungal application. The study indicates that conversion of Kushthadi Lepa into an Ointment dosage form can provide better convenience and patient acceptability while retaining the therapeutic potential of the formulation. The comparative pharmaceutical, Analytical and Antifungal findings support further evaluation of Kushthadi Ointment as a topical Ayurvedic Antifungal formulation.

KEYWORDS: Kushthadi Lepa, Kushthadi Ointment, Siddha Taila, Sikta, Antifungal activity.

INTRODUCTION

Ayurveda which is considered as an upveda of Atharva veda, one of the four vedas representing a holistic medical system addressing physical, mental and spiritual Well being. This ancient system of medicine which is derived from Sanskrit words “Ayush” which means life and “Veda” i.e. knowledge meaning the Science of life. It emphasizes maintaining health and preventing disease through balance of Dosha (body Humors), Dhātu (tissues) and mala (Excretory products) along with proper diet, lifestyle and use of medicines. According to Charaka Samhita, the main objectives of Ayurveda are: “Swasthasya swasthya rakshanam, aturasya vikara prashamanam cha.” Preservation of health in the healthy

and treatment of disease in the diseased. Thus, Ayurveda integrates preventive, promotive, and curative aspects of health, establishing itself as a comprehensive and sustainable system of medicine. Thus Ayurveda a holistic system of medicine that began in India more than 5000 years ago means the study of life. It takes a natural approach to all aspects of health and well-being. The focus of Ayurveda treatment is to support the body in removing toxins and impurities, reduce symptoms, increase disease resistance, reduce stress, create more harmony and balance in life.

Ayurveda describes skin disorders under the broad concept of Kushtha, which encompasses a wide range of

dermatological manifestations. The management of skin disorders includes Shodhana, Shamana and various external therapeutic procedures. Among the external preparations, Lepa is an important dosage form in which medicinal substances are applied locally over the affected area.

Kushthadi Lepa is a classical herbal formulation indicated for skin disorders. The formulation comprises six drugs—Kushtha, Mulaka Beeja, Priyangu, Sarshapa, Haridra and Nagakeshara. These drugs possess traditionally described properties useful in the management of various skin conditions.

However, the conventional Lepa form has certain pharmaceutical limitations. The preparation requires appropriate mixing before application, may dry after application and may be less convenient for storage and transportation. Modern topical semisolid dosage forms such as ointments provide improved handling, ease of application and uniform distribution over the affected area.

Considering these aspects, an attempt was made to convert Kushthadi Lepa into an ointment dosage form. For this purpose, Tila Taila was subjected to Murchhana, followed by preparation of Kushthadi Siddha Taila. The medicated oil was then incorporated with Siktha to develop Kushthadi Ointment. The present work therefore aimed to compare the classical Lepa and its modified ointment formulation from pharmaceutical, analytical and in-vitro antifungal perspectives.

MATERIALS AND METHODS

Equipments

1. Electric weighing machine
2. Measuring Jar
3. Khalva yantra (Pestle & Morter)
4. Stainless Steel Vessel
5. Spoon
6. Gas Cylinder
7. Sieve no. 85
8. Bowls, Spatula,
9. Cotton Vastra
10. Air tight containers of 100 gm size.

I) Material for preparing Kushthadi Lepa

Ingredients	Quantity
Kushtha	10 gm
Mulakabeeja	10 gm
Priyangu	10 gm
Sarshapa	10 gm
Haridra	10 gm
Nagkeshara	10 gm



Procedure

- Raw bharad churnas were separately taken in Khalvayantra and triturated well.
- All the churna were sieved through sieve no. 85.
- Each drug churna was taken 10 gm.
- Total mixture obtained was 60 gm.
- The powders were mixed uniformly to form Kushthadi Lepa.
- The prepared Kushthadi Lepa was stored in air tight containers.

- Required quantity of liquid medium (Water) can be added to prepare a smooth paste (Lepa) while applying.

II) Material for Tila Taila Murchana.

Sr. No.	Drugs	Latin Name	Quantity
1	Manjishta	Rubia cordifolia	48 g
2	Haridra	Curcuma longa	12 g
3	Lodhra	Symplocos racemosa	12 g
4	Musta/ Nagaramotha	Cyperus rotundus	12 g
5	Nalika	Vetiveriazizanioides	12 g
6	Amalaki	Embllica officinalis	12 g
7	Haritaki	Terminalia chebula	12 g
8	Vibhitaki	Terminalia belerica	12 g
9	Suchipushpa/ Kevada	Pandanus odoratissimus	12 g
10	Vatankura	Ficus bengalensis	12 g
11	Hribera	Pavonia odorata	12 g
12	Tila Taila	Sesamum indicum	768 ml
13	Water		3.72 Ltr.



PROCEDURE

- Tila taila 768 ml. was taken in clean and dry stainless-steel vessel and subjected to mild heat till the boiling point is reached. It is taken out of fire and allowed to self cool.
- All the fine powdered drug were taken in measured quantity, mixed well and converted into homogenous blend by adding water to prepare Kalka.
- Prepared Kalka was added to preheated til tail and constantly stirring was done to mix properly.
- 3.72 Ltr. of water i.e. four times of til tail was added slowly in to vessel. Heating was given to mixture on slow flame and continous stirring was done.
- On 1st day of after 4 hr heating, it was allowed to self cooling and plate was covered over to prevent dust fall.
- On Day 2nd heating was again continued till tiltaila became water free and all Sneha Siddhi lakshanas were observed. Kalka attained perfect wick shape when rolled between thumb and index finger. No sound was produced when kalka was put on fire.

- Vessel was taken out from fire after observing all qualities of sneha siddhi.
- Finally, after slight cooling prepared Murchit Tila Taila was filtered through a clean white cotton cloth and stored in cleaned dried bottle.

III) Material for Kushthadi Siddha taila

Sr. No.	Ingredients	Quantity
1	Kushtha	25 g
2	Mulaka Beeja	25 g
3	Priyangu	25 g
4	Sarshapa	25 g
5	Haridra	25 g
6	Nagkeshara	25 g
7	Murchit Tila Taila	600 ml
8	Water	2.4 Ltr.



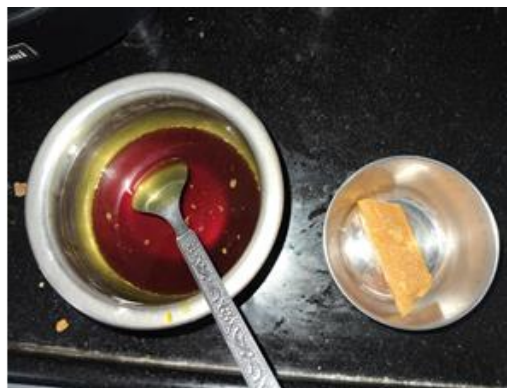
Procedure

- Murchita Tila Taila 600 ml. was taken in clean and dry stainless-steel vessel and subjected to mild heat, till the boiling point is reached. It is taken out of fire. Allowed to self cool.
- All the fine powdered drug 25 gm each were taken and mixed well and converted into homogenous blend by adding water to prepare Kalka.
- Prepared Kalka was added to preheated Murchit Tila Taila and constantly stirring was done to mix properly.
- 2.4 Ltr. of water i.e. four times of Tila Taila was added slowly into vessel. Heating was given to mixture on slow flame and continuous stirring was done.
- On 1st day of heating after 4 hr, it was allowed to self cooling and plate was covered over to prevent dust fall.
- On Day 2nd heating was again continued till Tila Taila became water free and all Sneha Siddhi lakshanas were observed. Kalka attained perfect wick shape when rolled between thumb and index finger. No sound was produced when kalka was put on fire.
- Vessel was taken out from fire after observing all qualities of sneha siddhi.
- Finally, after slight cooling prepared Murchit Tila Taila was filtered through a clean white cotton cloth and stored in cleaned dried bottle.

IV) Material for Kushthadi Ointment

Ingredients

Kushthadi Siddha taila 180 ml.
Bee wax / Sikta 30 gm.



Procedure

- 180 ml. of Kushthadi siddha Taila was taken.
- It was placed in a clean stainless steel vessel and was heated gently on mild fire (Mandagni)
- 30 gms. of Beewax was added slowly into the warm oil.
- Continuous stirring was done to ensure uniform mixing till mixture becomes homogenous i.e. Beewax melts completely and mixes uniformly with the oil.
- Homogenous mixture is allowed to cool and after cooling Ointment is obtained.
- Obtained Ointment is stored in wide mouth container and is labelled.

OBSERVATIONS AND RESULTS

* Quantity of Ingredients Taken for Preparation.

Ingredients	Quantity
Kushtha	10 gm
Mulakabeeja	10 gm
Priyangu	10 gm
Sarshapa	10 gm
Haridra	10 gm
Nagkeshara	10 gm
Total	60 gm

* Observation of Kushthadi Lepa During Preparation

Observations during preparation of Kushthadi Lepa

Parameter	Observations
Colour	Dull Yellowish in colour
Odour	Characteristic aromatic
Texture	Fine Smooth Soft without Coarse particles
Homogeneity	Uniform blend with no visible Segregation.

* Results of Kushthadi Lepa

Sr. No.	Details	Quantity
1.	Total weight of ingredients	60 gm
2.	Total duration of Mardan	30 Min.
3.	Total weight of Kushthadi Lepa	58 gm
4.	Total loss during preparation	2 gm
5.	Total duration for preparation	1 day

Observations during Preparation of Murchita Tila Taila

Parameter	Observation
Initial colour	Pale yellow to light golden yellow sesame oil.
Initial odour	Characteristic smell of sesame oil.
During heating	Mild frothing appeared initially due to moisture evaporation.
Colour change	Gradually changed from pale yellow to golden yellow and finally to a clear brownish golden colour.
Odour change	Characteristic aroma of the herbal ingredients developed.
Consistency	Slightly increased viscosity but remained free flowing.
Kalka appearance	Kalka became soft initially, then turned darker and granular towards the end of the process.
Foam	Frothing gradually decreased and disappeared after complete evaporation of water.

Result of Murchit Tila Taila

Sr. No.	Details	Quantity
1.	Total weight of ingredients	168 gm
2.	Initial Quantity of Tila Tail	768 ml
3.	Final Quantity of Murchit Tail	700 ml
4.	Total loss during preparation	68 ml
5.	Total duration of Preparation	2 days

Observations during preparation of Kushthadi Siddha Taila

Parameter	Observation
Colour	Changes from golden yellow to Yellowish brown and finally dark brown
Addition of kalka During boiling	Paste mixed uniformly with oil, continuous Stirring was done to avoid sticking at the bottom
Odour	Developed pleasant characteristic aromatic odour
Appearance of kalka	Gradually turned dark brown
Foam	Frothing observed at the beginning and disappeared on completion of heating
Moisture	Complete evaporation of water indicated by absence of crackling sound

Kushthadi Siddha Taila

Sr. No.	Details	Quantity
1.	Total weight of ingredients	150 gm
2.	Initial Quantity of Murchit Tila Taila	600 ml
3.	Final Quantity of Siddha Taila	560 ml
4.	Total loss during Preparation	40 ml
5.	Total duration of Preparation	2 days

Observation during preparation of Kushthadi Ointment.

Parameter	Observation
Initial Appearance	Kushthadi Taila was dark brown and Beewax was yellow and solid at room temperature
Heating	Beewax melted completely on gentle heating
Colour	Mixture changed from dark brown oil to dark brown semi-Solid mass
Odour	Characteristric pleasant odour of Kushthadi Taila was retained with mild Beewax smell
Consistency	Liquid to Semi Solid on cooling
Phase Separation	No Separation of oil and Beewax
Appearance	Smooth brown semi-solid consistency

Result of Kushthadi Ointment

Sr. No.	Details	Quantity
1.	Total weight of ingredients	210 gm
2.	Final weight of Kushthadi Ointment	190 gm
3.	Total loss during preparation	20 gm
4.	Total duration of preparation	10 Min.

DISCUSSION

The present study was undertaken to comparatively evaluate the pharmaceutico-analytical characteristics and in-vitro antifungal activity of Kushthadi Lepa and its modified ointment formulation. The study was designed to assess whether conversion of the Lepa into an ointment dosage could provide a suitable and pharmaceutically convenient topical preparations while retaining the therapeutic potential of the original formulation.

Kushthadi Lepa ingredients are described for their properties relevant to management of Kushtha. These

ingredients possessed predominantly anti-microbial, anti-inflammatory and skin supportive properties. Thus combined action of the ingredients contributed to the therapeutic potential of Kushthadi Lepa in fungal infection.

I) During pharmaceutical preparation of Kushthadi Lepa Raw materials were procured and authenticated from lab, cleaned, dried, powdered separately and sieved to obtain fine and uniform particle size. All the drugs were taken in equal quantity and mixed uniformly and liquid medium can be added later to prepare a smooth paste (Lepa). The characteristic colour, odour and texture

indicated proper processing and was found to be suitable for further pharmaceutical and analytical evaluation.

II) Discussion on preparation of Tila Murchana -

Tila Tila Murchana was done before preparing Kushthadi Siddh taila. For the process of Murchana Drugs were taken in equal part each except Manjishta along with 4 parts of Tila Taila and 16 part of water. Initially Tila was clear light yellow in colour having characteristic odour and oily consistency. After addition of paste (kalka) mixture became turbid changing to yellowish brown colour. Continuous heating with gentle stirring was done to prevent paste from sticking to the bottom of vessel. During boiling, froth and bubbling were observed due to evaporation of water. As the process continued intensity of bubbling gradually decreased indicating reduction of moisture. The colour gradually changed from light yellow to golden yellow and oil developed pleasant aromatic odour. At the end of the process while the bubbling ceased Kalka showed signs of proper frying indicating completion of Murchana. Prepared Murchit Tila Taila was filtered while warm. The oil appeared clear, free from suspended particles aromatic and suitable for further preparation of Kushthadi Siddha Taila.

III) Preparation of Kushthadi Siddha taila: - For this process main drugs [Kushtha, Mulaka, Priyangu, Sarshapa, Haridra & Nagakeshara] were taken in equal part and Kalka of these drugs was prepared and kept aside. Murchita Tila Taila 4 parts was taken in clean and dry Stainless Steel vessel and subjected to mild heat. Kalka which was prepared was added and later 16 part water was added. Previously Murchita Tila Taila was clear golden yellow in colour, possessed a pleasant aroma, after adding paste of drugs the mixture became turbid and yellowish brown in colour. Continuous stirring resulted in uniform mixing of the oil, Kalka and liquid, preventing the Kalka from settling at the bottom. Vigorous bubbling and frothing was seen during the initial stage due to evaporation of water. Colour of the oil gradually changed from golden yellow to brownish yellow as the active constituents of the drugs were extracted into the oil. The Kalka initially remained soft and moist but gradually became thicker and granular as the moisture content decreased. The Kalka exhibited the characteristic of Madhyama Sneha paka. It became soft, non-sticky and could be rolled between the fingers and showed no excess moisture. Bubbling gradually reduced completely towards the end of the process indicating completion of Sneha paka. Thus finished Kushthadi Siddha Taila was filtered while warm. The final oil was clear, free from suspended particles brownish yellow in colour, aromatic and possessed a smooth homogeneous consistency suitable for further preparation of Kushthadi Ointment.

Analytical Review

The Analytical study was carried out to assess the quality and standardization of Kushthadi Lepa, Murchita Tila

Taila, Kushthadi Siddha Taila and Kushthadi Ointment. Organoleptic characteristics such as colour, odour, appearance and consistency were recorded. Physicochemical parameters were evaluated to establish the quality characteristics of the prepared formulations. TLC profiling further provides a characteristic chemical fingerprint of the formulation and becomes useful for further standardization and quality control studies.

I) Kushthadi Lepa:- Analytical evaluation of Kushthadi Lepa and Ointment was carried out to assess the quality, purity, uniformity and suitability for therapeutic use. Standard physicochemical parameters were evaluated to ensure the formulation met acceptable quality standards. The organoleptic evaluation revealed dull yellow coloured having characteristic aromatic odour and bitter taste. The moisture content (Loss on drying) of Lepa was 9.80% was within acceptable limits, suggesting adequate drying of powdered drugs. Lower moisture content minimizes microbial contamination and enhances the shelf life of the formulation. The pH of Lepa was 4.79 within suitable range. The extractive values Alcohol Soluble and water Soluble were 20.14% and 16.48% respectively and indicated the presence of Alcohol Soluble and water Soluble phyto constituents in the formulation. Ash value was about 0.52% indicating minimal contamination with inorganic matter or other extraneous material. This reflects the use of properly cleaned and authenticated raw drugs during pharmaceutical processing.

II) Analytical study of Murchita Tila Taila and Kushthadi Siddh Taila.-

Analytical evaluation was carried out to assess the quality, purity and pharmaceutical characteristic of Murchit Tila Taila and Kushthadi Siddha Taila. The analysis was performed to confirm that the oils were prepared according to classical Ayurvedic procedures and possessed the desired quality for further use in Ointment preparation. Murchana is an important Pharmaceutical process that improves the quality of Tila Taila by reducing undesirable colour, odour, enhancing stability and increasing its capacity to extract and retain the active constituents of drugs. The Analytical findings indicated that Murchit Tila Taila possessed characteristic odour, brownish in colour with good oily consistency, confirming successful completion of the murchana process. The physicochemical parameters like pH 3.26, LOD 2.65% specific gravity 0.916 g/ml, viscosity 31.0 cst, were found to be within acceptable limits. Whereas the analytical parameters of Kushthadi Siddha Taila demonstrated satisfactory quality. The oil remained clear after filtration and was free from suspended particles indicating proper filtration and completion of the process. It showed Brown Colour with characteristic odour, viscous to touch. The values LOD 2.50%, pH 3.42, viscosity 25.0 cst, Iodine Value and peroxide value 7.58 and 2.1 meq/1000 gm respectively were within permissible limits. The peroxide value suggested that the oil had not undergone significant oxidative deterioration, while the acid value

of 2.78 reflected minimal hydrolytic degradation. The iodine value indicated the presence of unsaturated fatty acids, characteristic of Tila Taila and the saponification value of 147.85 confirmed the normal fatty acid composition of the oil. Over all the analytical findings confirmed that both Murchit Tila Taila and Kushthadi Siddha Taila possessed satisfactory physicochemical characteristics. The Murchana process enhanced the quality and stability of Tila Taila while the preparation of Kushthadi Siddha Taila successfully incorporated the active constituents without affecting the quality of oil. These Analytical observations support the use of Kushthadi Siddha Taila for the further preparation of kushthadi Ointment and for further pharmacological and invitro Antifungal evaluation.

III) Analytical Study of Kushthadi Ointment:- The preparation of Kushthadi Ointment involved the incorporation of Kushthadi Siddha Taila into an appropriate Ointment base under controlled conditions. The Analytical findings indicated that the final product possessed Smooth, Soft, homogenous consistency Suggesting proper mixing and successful formulation of the Ointment. Organoleptic evaluation showed that the Ointment had a characteristic herbal odour, dark brown colour which can be attributed to the presence of herbal constituents extracted into the oil during Sneha paka. The physicochemical parameter of Ointment were found to be within acceptable limits. The pH 3.36 of the Ointment was Suitable for topical application indicating that it is unlikely to cause skin irritation. The spreadability of 1080 cm² test demonstrated that the Ointment could be easily applied over the skin Surface, ensuring better patient compliance and uniform drug distribution. The consistency and viscosity of the Ointment were found to be optimal, which is essential for maintaining stability and ensuring prolonged contact with the affected area. Over all the Analytical findings confirmed that Kushthadi Ointment possessed satisfactory physicochemical and organoleptic characteristics. The formulation was found to be stable homogenous and suitable for topical application. These results Support the quality and reliability of Ointment as a therapeutic preparation and justify its further evaluation for Antifungal studies.

Antifungal Review

The Antifungal activity of Ointment was evaluated to understand its potential effectiveness against common fungal pathogens mainly *Candida albicans*, *Aspergillus niger* and Green fungus. This formulation prepared usually indicated in skin disorder where fungal involvement is Suspected hence assessing its Antifungal activity provides scientific validation to its classical therapeutic claims. The observed Antifungal activity may be attributed to the presence of various bioactive phyto constituents present in herbal ingredients of Kushthadi Siddha Taila. Also compounds Such as phenolics, flavonoids etc are known to exhibit Significant Antifungal properties. These constituents may act

through multiple mechanisms, including disruption of fungal cell membrane integrity, inhibition of ergosterol synthesis, leakage of intracellular components and interference with essential fungal metabolic enzymes, such multifaceted actions can collectively inhibit fungal growth and reduce the ability of pathogens to colonize the skin. Here Ointment showed activity against *Candida albicans* and Green fungus i.e. zone of inhibition was 31 mm and 30 mm respectively as compared to that of *Aspergillus niger* which showed zone of inhibition 21 mm. *Candida albicans* is commonly associated with Cutaneous and mucocutaneous infections while *Aspergillus niger* causes superficial infections. Kushthadi Lepa showed some activity against *Candida albicans*, zone of inhibition was 10 mm whereas it failed to show activity against *Aspergillus niger* and Green fungus. Over all the findings suggest that Kushthadi Ointment possess promising Antifungal potential which may be attributed to the synergistic action of its phytochemical constituents.

Comparative Study of Kushthadi Lepa and Ointment

The comparative study between Kushthadi Lepa and Kushthadi Ointment was undertaken to evaluate their relative Antifungal potential and therapeutic applicability in the management of fungal skin infections. The study provides an opportunity to correlate classical Ayurvedic dosage forms with that of modern pharmaceutical equivalents in terms of efficacy and usability. Here differences in the formulation base significantly influence therapeutic performance. Kushthadi Lepa being a freshly prepared semisolid paste allows direct application of a higher concentration of active herbal constituents onto the affected area, so this result in a more immediate but relatively short listed action due to their faster drying and limited retention on the skin surface. In contrast, Ointment prepared provides enhanced occlusiveness and prolonged contact time with the skin. This facilitates better penetration of active constituents into the stratum corneum there by potentially improving sustained Antifungal activity. Ointment also ensures uniform distribution and gradual release of active compounds which may contribute to prolonged therapeutic action and improved patient compliance due to ease of application, on the other hand Lepa may offer the advantage of a cooling and soothing effect, which can be beneficial in acute inflammatory and pruritic conditions associated with fungal infections. Here both formulations exhibit activity against *Candida Albicans*, which is responsible for a wide range of cutaneous and dermatophytic infections. Here the ability of both dosage form to inhibit these organisms supports their traditional use in skin ailments. Also Kushthadi Ointment showed activity against Green fungus and *Aspergillus niger*.

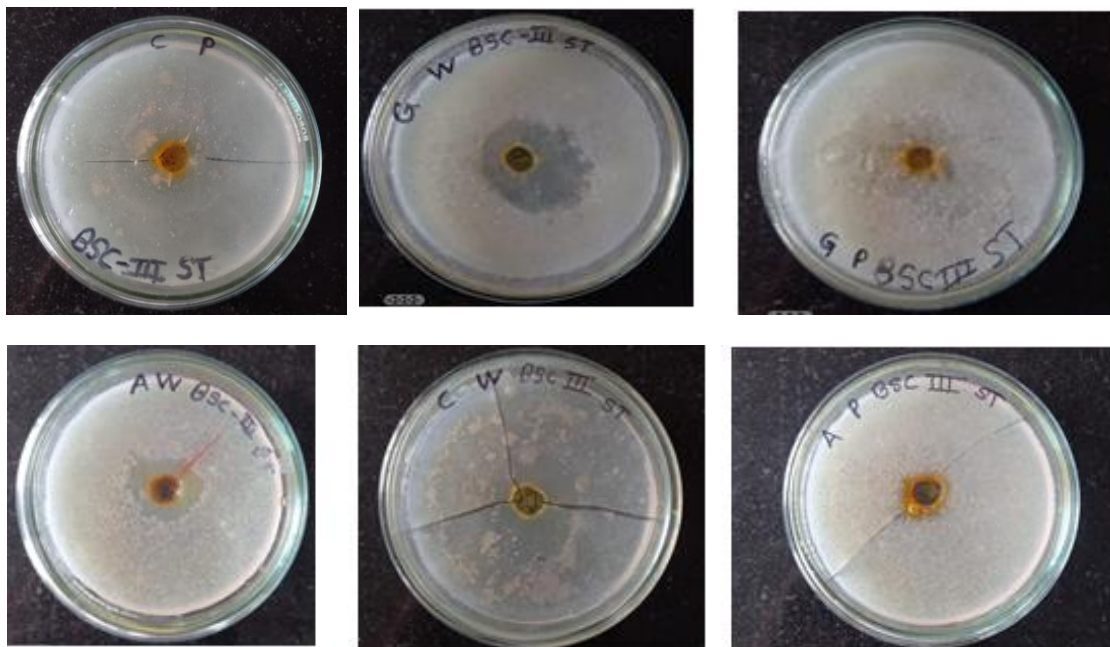
Overall the comparative evaluation suggests that while both Kushthadi Lepa and Kushthadi Ointment possess some less or more Antifungal potential, Ointment offered superior sustained activity as compared to Lepa.

Ointment also reduces frequent reapplication and minimizes wastage. So from modern pharmaceutics

perspectives Ointment offered controlled drug release, better penetration and protection of affected area.

Comparative Discussion of Kushthadi Lepa & Kushthadi Ointment.

Parameter	Kushthadi Lepa	Kushthadi Ointment
Preparation	Freshly prepared	Ready to use
Shelf life	Short	Longer
Stability	Less	More
Spreadability	Good	Better
Washability	Easy	Moderate
Retention time	Short	Prolonged





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Result of Antifungal Activity of Medicinally Important Samples.

Sr. No.	Sample	<i>Candida Albicans</i>	<i>Aspergillus Niger</i>	<i>Green Fungus</i>
1	Powder	10 mm	No Zone	No Zone
2	Ointment (Wax)	31 mm	21 mm	30 mm



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CONCLUSION

Kushthadi Lepa is mentioned in Bhaishajya Ratnavali and Chakradatta. The reference of Chakradatta has been taken for the study. The present study, “A comparative pharmaceutico Analytical and invitro Antifungal activity of Kushthadi Lepa and it's Ointment” shows following conclusion.

Kushthadi Lepa, MurchitaTila Taila, Kushthadi Siddha Taila, and Kushthadi Ointment were prepared according to classical Ayurvedic principles. The pharmaceutical procedures were standardized, and each stage of preparation was completed successfully with satisfactory observations.

The analytical evaluation demonstrated that all formulations complied with acceptable organoleptic and physicochemical quality parameters. The findings confirmed the purity, homogeneity, stability, and pharmaceutical quality of the prepared formulations. Kushthadi Ointment showed desirable characteristics such as smooth consistency, good spread ability, uniformity, stability, and absence of phase separation, making it suitable for topical application.

The in-vitro Antifungal evaluation demonstrated that both Kushthadi Lepa and Kushthadi Ointment possess Antifungal activity against the selected fungal organisms. These findings scientifically support the traditional use of Kushthadi formulations in the management of skin disorders associated with fungal infections.

The comparative evaluation indicated that while both formulations exhibited Antifungal potential, the Ointment dosage form offered additional pharmaceutical advantages, including ease of application, better adherence to the skin, prolonged contact time, improved patient compliance, and enhanced storage stability. Therefore, Kushthadi Ointment can be considered a convenient and effective alternative to the classical Lepa formulation for topical use.

The present work also contributes to the standardization of Kushthadi formulations by providing pharmaceutical and analytical data that may serve as reference information for future research.

Overall, the study concludes that Kushthadi Ointment is a stable, standardized, and pharmaceutically acceptable dosage form with promising Antifungal activity and may be considered a suitable modern topical formulation derived from the classical Kushthadi Lepa.

SCOPE OF STUDY

Further studies can be carried out to evaluate the clinical efficacy and safety of Kushthadi Lepa and its Ointment in larger patient populations. Advanced analytical techniques such as HPTLC/HPLC may be used for better standardization and identification of marker compounds. Further stability, toxicity, irritation and in-vivo Antifungal studies can be conducted. The formulation may also be tested against a wider range of fungal pathogens and compared with standard Antifungal drugs.

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