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AN ANALYTICAL STUDY OF PRAPAUNDARIKADYA TAILA AND ITS MODIFIED FORM OF OINTMENT AND EMULGEL

Dr. Vismitha K. R.*[1] and Dr. Surekha S. Medikeri[2]

[1]P.G. Scholar, Dept. of P.G. and Ph.D. Studies in Rasa Shastra and Bhaishajya Kalpana, GAMC, Bengaluru.
[2]Principal and HOD, Department of P.G. and Ph.D. Studies in Rasashastra and Bhaishajya Kalpana, GAMC, Bengaluru.

***Corresponding Author: Dr. Vismitha K. R.**
P.G. Scholar, Dept. of P.G. and Ph.D. Studies in Rasa Shastra and Bhaishajya Kalpana, GAMC, Bengaluru.

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ABSTRACT
Prapaundarikadya Taila, an Ayurvedic formulation, has been traditionally used for wound healing. However, its oily nature can limit its application and patient compliance. To address these limitations, this study aimed to develop and evaluate modified forms of Prapaundarikadya Taila, including an ointment and an emulgel. The formulations were prepared using standard pharmaceutical techniques and evaluated for their organoleptic and physico-chemical properties. The results demonstrated that the modified formulations possessed desirable characteristics for topical application. Analytical results of this study can be used as preliminary standard for the same.

KEYWORDS: Prapaundarikadya taila, Ointment, Emulgel.

INRODUCTION

Sneha Kalpana/paka may be defined as "A pharmaceutical process to prepare oleaginous medicaments from the substances like *Kalka* (herbal paste of different parts of botanicals), *Kwatha* (specifically prepared decoction in accordance of Ayurvedic principles) or *Drava Dravya* (any other liquid such as milk, self-expressed juices, meat juice, etc.) taken in specific proportion and by subjecting them to unique heating pattern and duration to fulfill certain pharmaceutical parameters, according to the need of therapeutics."[1]

Ointments are semisolid dosage form which usually act as visco-elastic materials when shear stress is applied. They generally contain medicinal ingredients and are used to be applied externally to the body for therapeutic effect. Many therapeutic agents used for topical application to intact or broken skin or to mucous membranes are presented in the form of semisolid consistency variously designated as ointments, creams, pastes etc. It is used mainly as protective or emollient for the skin.

Topical treatments in creams, ointments, gels, and lotions are an important part of the dermatological treatment library. They have relatively no serious side effects. Compared to other semisolid preparations, the use of gels has appeared in cosmetics and pharmaceutical preparations. When gels and emulsions are used in combination, they are called Emulgel. Emulgel is a promising hydrophobic drug delivery system. Emulgel is a gelling emulsion mixed with a gelling agent. The many advantages of gels primarily limit the delivery of hydrophobic drugs. Therefore, to overcome this limitation, emulsion methods are used.

Ayurveda, the ancient Indian system of medicine, offers a plethora of herbal formulations for various ailments, including wound healing. *Prapaundarikadya Taila*[2] is mentioned in *Charaka Samhita* under *Dwivraneeya Chikitsa* and elaborated in *ChakraDatta* under *Vranashothaadikhara*[3] for wound healing (*Vrana Ropana*). However, its oily nature can often limit its application and patient compliance. To address these limitations, modern pharmaceutical techniques can be employed to develop more convenient and effective dosage forms.

In recent years, there has been a growing interest in exploring the potential of traditional medicines and modifying them into modern dosage forms. This study aims to investigate the feasibility of converting *Prapaundarikadya Taila* into modern formulations such as ointments and emulgel. By doing so, we aim to enhance its therapeutic efficacy, improve patient compliance, and extend its shelf life.

This research will involve a comprehensive analytical study of *Prapaundarikadya Taila* and its modified forms. The study will focus on evaluating their physicochemical properties, stability, and potential therapeutic benefits. By understanding the characteristics of these formulations, we can optimize their preparation and application, ultimately leading to improved patient outcomes.

MATERIALS AND METHODS

Pharmaceutical study of *Prapaundarikadya Taila* was done in laboratory of Rasashastra and Bhaishajya Kalpana, Government Ayurvedic Medical College, Bangalore, Karnataka.

Pharmaceutical study of Prapaundarikadya Taila modified ointment and emulgel as carried out in PES College Pharmacy, Electronic city, Bangalore.

Organoleptic study was carried out in the PG Practical lab, of Rasashastra and Bhaishajya kalpana, GAMC, Bangalore.

Physicochemical analysis was carried out at Drug testing laboratory. Government central pharmacy, Jayanagar, Ashoka piller Bangalore.

Instrumental analysis of FTIR was carried out at the Indian institute of science (IISc), Bengaluru.

Physicochemical analysis ointment and emulgel was carried out at PES College of pharmacy, electronic city, Bangalore.

Instrumental analysis of HPTLC for all samples was carried out at PES College of pharmacy, electronic city, Bangalore.

Raw drug collection

Raw drugs were purchased from S.P Khajrekar Pharmacy, Belagavi and were authenticated by the HOD of the Department of Dravya Guna, Govt Ayurveda Medical College, Bengaluru.

Samples of Prapaundarikadya taila and its modified form of ointment and emulgel were prepared and coded as PT, PTO, and PTE. Trial ointments were coded as O_1, O_2, O_3 and trial emulgels were coded as E_1, E_2, E_3.

Table 1: Showing ingredients of *Tilatailamurchana*.[4]

Sl.no	INGREDIENT	LATIN NAME	AMOUNT	QUANTITY (In g)
1	*Manjishta*	*Rubia cordifolia*	1/16 part	156
2	*Haridra*	*Curcuma longa*	1/64 part	39
3	*Lodra*	*Symplocos recemosa*	1/64 part	39
4	*Musta*	*Cyperus rotundus*	1/64 part	39
5	*Nalika*	*Cinnamomum zeylanica*	1/64 part	39
6	*Haritaki*	*Terminalia chebula*	1/64 part	39
7	*Vibhitaki*	*Terminalia bellerica*	1/64 part	39
8	*Amalaki*	*Emblica officinalis*	1/64 part	39
9	*Ketaki moola*	*Pandanus tectorus*	1/64 part	78
10	*Hribera*	*Plectranthus vettiveroides*	1/64 part	39
11	*Vatankura*	*Ficus bengalensis*	1/64 part	78

Murchita tila taila was prepared. 2500 ml of *tila taila* was taken, added with 624g ingredients mentioned in table no. 1 and 10000 ml of water. Heating was carried out in *mandagni* for 10 hours and 2300 ml *murchita tila taila* was obtained. it was used as base for the *Prapaundarikadya taila*.

Table no. 2: showing the quantity of ingredients required for PT.

Sl no.	Ingredients	Botanical name	Family	Parts used	Quantity	Quantity (in g)
1	*Prapaundarika*	*Nelumbo nucifera Gartn.*	Nymphaceae	Stem	1Part	83.3
2	*Yashtimadhu*	*Glycyrrhiza glabra Linn.*	Fabaceae	Root	1Part	83.3
3	*Kakoli*	*Lilium polyphyllum D. Don.*	Liliaceae	Root	1Part	83.3
4	*Ksheera kakoli*	*Fritillaria roylei. Hook.*	Liliaceae	Root	1Part	83.3
5	*Shweta Chandana*	*Santalum album Linn.*	Santalaceae	Heart wood	1Part	83.3
6	*Rakta Chandana*	*Pterocarpus santalinus Linn.*	Fabaceae	Heart wood	1part	83.3

To 2000ml of *murchitha tila taila* 500g of *kalka* of the ingredients of the above table and 8000ml of water was added. Heating was carried out in *mandagni* for 8 hours 15 min. and 1620 ml *Prapaundarikadya taila* was obtained. it was used as ingredient in preparation of ointment and emulgel.

Formulation of ointment base

Table 3: quantity of ingredients for ointment base.

Sl no.	Ingredients	Quantity (O_3) (in grams)
1	Bees wax	20
2	Emulsifying wax	2.5

Formulation of *Prapaundarikadya taila* ointment

Table 4: quantity of ingredients for PTO.

Sl no.	Ingredients	Quantity (O_3)
1	Ointment base	22.5g
2	*Prapaundarikadya taila*	77.5ml

Initially ointment base was prepared by weighing accurately the bees wax which was placed in evaporating dish on water bath. After melting of bees wax emulsifying wax was added and stirring gently to aid melting and mixing homogeneously. The *Prapaundarikadya taila* ointment was prepared by mixing accurately weighed Prapaundarikadya taila to the ointment base by levigation method to prepare a smooth homogeneous paste. The prepared ointment was transferred in a suitable glass container.

Table 5: showing raw drugs for *Prapaundarikadya taila* emulgel.

Sl no.	Ingredients (in grams)	E_3
1	Carbopol	2
2	Tween 80	2.16
3	Span 80	0.84
4	Methyl paraben	0.3
5	Triethanolamine	q.s
6	Water	q.s
7	*Prapaundarikadya taila*	15

PROCEDURE

Step: 1. Formulation of Gel base

The gel base is formed by dissolving a known quantity of polymer Carbopol 934 into distilled water with constant stirring at a moderate speed until uniform mixture was made. And pH is adjusted by using Triethanolamine.

Step: 2. Formulation of Emulsion

A. **Preparation of aqueous phase:** The aqueous phase of the emulsion was prepared by dissolving the Tween 80 in purified water
B. **Methyl paraben was dissolved in aqueous phase.** To preserve the emulsion, methyl paraben was dissolved was dissolved in the aqueous phase
C. **Preparation of Oil phase:** The Oil phase of the emulsion prepared by the dissolving the Span 80 in *Prapaundarikadya taila*.

Step: 3 Formulation of oil-in water or Water-in oil type of Emulsion: Both the aqueous and the oil phase were heated in a water bath at 70 ^{0}C separately. Then the oil phase was added drop wise to the aqueous phase with continuous stirring using homogenizer at speed of 3000 rpm for 10 min. then allowed to cool at room temperature.

Step: 4 Formulation of emulgel: At the end the gel and emulsion portions were mixed in 1:1 ratio with moderately stirring to prepare emulgel To gel base, add the prepared emulsion dropwise with continuous stirring and add methyl paraben solution and continue the stirring which gives a clear emulsion.

Table 6: showing ingredients for different ratio of ointment.

Sl no.	Ingredients (in grams)	Quantity (O_1)	Quantity (O_2)	Quantity (O_3)
1	Bees wax	8	6	4
2	Emulsifying wax	0.5	0.5	0.5
3	*Prapaundarikadya taila*	11.5	13.5	15.5

Table 7: showing ingredients for different ratio of *Prapaundarikadya taila* emulgel.

Sl no.	Ingredients (in grams)	E_1	E_2	E_3
1	Carbopol	1	1.5	2
2	Tween 80	1	1.5	2.16
3	Span 80	0.45	0.5	0.84
4	Methyl paraben	0.05	0.09	0.3
5	Triethanolamine	q. s	q. s	q. s

6	Water	q. s	q. s	q. s
7	*Prapaundarikadya taila*	15	15	15

Analytical study

In the present globalization and standardization era there is a necessity of understanding of drugs based on modern analytical methods. Ancient and modern parameters are different, but the objectives remain same Physicochemical analytical of the drugs were carried out by using current analytical methodology.

Analysis of murchitha tila taila and Prapaundarikadya taila

A. Organoleptic evaluation.
B. Physico-chemical tests.

A. Organoleptic evaluation: This is carried out by sensory organs.

1. Sparsha (Consistency)
2. Rupa (Appearance)
3. Gandha (Odor)

B. PHYSICO CHEMICAL ANALYSIS

This Physical and external Features can be known by these methods. It provides basic idea about the identification and quality of the formulation without any chemical test.

1. Refractive index at 25°C[5]
2. Specific gravity[6]
3. Ph[7]
4. Viscosity[8]
5. Saponification value[9]
6. Loss on drying[10]
7. Iodine value[11]
8. Acid value[12]
9. Rancidity[13]
10. Peroxide value[14]

EVALUATION PARAMETERS FOR *PRAPAUNDARIKADYA TAILA* OINTMENT AND EMULGEL[15]

1. Organoleptic characters
2. pH
3. Spreadability
4. Tube Extrudability
5. Loss on drying
6. Centrifugation test
7. Washability
8. Viscosity
9. Stability studies.

Instrumental analysis

1. HPTLC[16]
2. FTIR[17]

OBSERVATIONS AND RESULTS

Table No 8: Showing Organoleptic characters of *Prapaundarikadya Taila*.

Parameter	Observation
Colour	Dark red
Odour	Characteristic odour
Appearance	Greasy
Texture	Oily

Table 9: Showing Results of standardization Parameters of *Raw tila taila, Murchita tila Taila* and *Prapaundarikadya taila*.

Sl. no.	Parameters	Raw Tila Taila	Murchita tila Taila	Prapaundarikadya taila
1	Specific gravity	0.917	0.919	0.921
2	Refractive index	1.465	1.466	1.466
3	pH	6.6	7.1	7.3
4	Viscosity	36.7cP	34.5 cP	32.14 cP
5	Saponification value	190.08	201.22	212.45
6	Acid value	5.87	5.2	4
7	Iodine value	112.21	109.05	108.30
8	Peroxide value	0	0	0
9	Rancidity	Fat is not oxidized	Fat is not oxidized	Fat is not oxidized
10	LOD	0.36%	0.07%	0.05%

Table 10: Showing results of Physico chemical parameters of *Prapaundarikadya taila* ointment trial (O_1, O_2, O_3) samples.

Sl. No.	Physicochemical parameters	O_1	O_2	O_3
1.	Appearance	Red, homogeneous, characteristic odour, greasy ointment	Red, homogeneous, characteristic odour, creamy ointment	Red, homogeneous, characteristic odour, smooth ointment
2.	pH	6.6	6.8	6.8
3.	Spreadability(gm.cm/sec)	13.2	15.4	17.9
4.	Tube Extrudability (%)	61.8	73.6	78.1
6.	Centrifugation test	No phase separation	No phase separation	No phase separation
7.	Washability	Sticky but washable	Sticky but washable	Washable
8.	Viscosity (cp)	9125	9205	9398

NOTE: Formulation O_3 has good spreadability, extrudability, and viscosity compared to O_2 and O1. So, formulation ointment O_3 was considered ideal for the preparation of *Prapaundarikadya taila* ointment.

Table no. 11: Showing results of Physico chemical parameters of Prapaundarikadya taila Emulgel trial (E_1, E_2, E_3) samples.

Sl. No.	Physicochemical parameters	E_1	E_2	E_3
1.	Appearance	Peach colour, homogeneous, characteristic odour, mildly viscous	Peach colour, homogeneous, characteristic odour, smooth gel.	Peach colour, homogeneous, characteristic odour, smooth gel.
2.	pH	6.1	6.5	6.8
3.	Spreadability (gm.cm/sec)	29.9	28.5	27.8
4.	Tube Extrudability (%)	83.9	83.2	81.7
6.	Centrifugation test	No phase separation	No phase separation	No phase separation
7.	Washability	Easily washable	Easily washable	Easily washable
8.	Viscosity (cp)	9825	9650	9586

NOTE: Formulation E_3 had good consistency, spreadability, extrudability, and viscosity compared to E_2 and E_1. Formulation E_3 remained free of fungal contamination for the entire 6-month study period under both ambient and accelerated conditions. Whereas formulations E_1 and E_2 with less preservative developed fungal contamination within a month. So, formulation emulgel trial E_3 was considered ideal for the preparation of *Prapaundarikadya taila* emulgel.

Formulation O_3 and E_3 are used for further analysis and evaluation
Each formulation was tested three times, with the average taken for standardization parameters.
Table 12: showing parameters of ointment Formulation O_3.

Sl no	Parameters	Initially	60^{th} day	120^{th} day	180^{th} day
1	**Appearance**	Red, homogeneous, characteristic odour, smooth ointment	Red homogeneous, characteristic odour, smooth ointment	Red homogeneous, characteristic odour, smooth ointment	Red homogeneous, characteristic odour, smooth ointment
2	**pH**	6.8	7.1	6.9	7.3
3	**Washability**	Washable	Washable	Washable	Washable
4	**Centrifugation test**	No phase separation	No phase separation	No phase separation	No phase separation
5	**Spreadability:(gm.cm/sec)**	17.9	18.5	20	21.5
6	**Extrudability**	103.2	102	104	106
7	**LOD**	0.64%	0.64%	0.67%	0.66%
8	**Viscosity (CP)**	9398	9401	9396	9403

Table 13: showing parameters of emulgel Formulation E_3.

Sl no	Parameters	Initially	60th day	120th day	180th day
1.	**Appearance**	Peach colour, homogeneous, characteristic odour, smooth gel.	Peach colour, homogeneous, characteristic odour, smooth gel.	Peach colour, homogeneous, characteristic odour, smooth gel	Peach colour homogeneous, characteristic odour, smooth gel
2.	**pH**	6.1	6.5	6.8	7.1
3.	**Washability**	Easily washable	Easily washable	Easily washable	Easily washable
4.	**centrifugation test**	No phase separation	No phase separation	No phase separation	No phase separation
5.	**Spreadability:(gm.cm/sec)**	29.85	29.51	28.6	25.4
6.	**extrudability**	81.81	81.75	81.72	81.63
7.	**LOD**	65.1%	65.1%	65.9%	66.5%
8.	**Viscosity (cP)**	9582	9580	9591	9587

Table 14: Showing results of standardization parameters of *Prapaundarikadya taila* ointment and emulgel.

Sl. No.	Physicochemical parameters	Specifications for ointment	Specifications for emulgel
1.	Appearance	Red, homogeneous, characteristic odour, smooth ointment	Peach colour, homogeneous, characteristic odour, smooth gel.
2.	pH	7.1	6.8
3.	Spreadability(gm.cm/sec)	20	27.8
4.	Tube Extrudability (%)	104	81.7
5.	Loss on drying (%)	0.65	65.8
6.	Centrifugation test	No phase separation	No phase separation
7.	Washability	Washable	Easily washable
8.	Viscosity (cP)	9400	9586

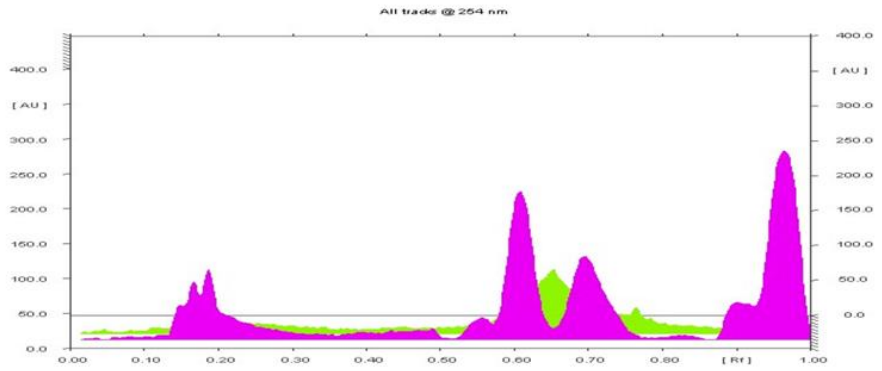


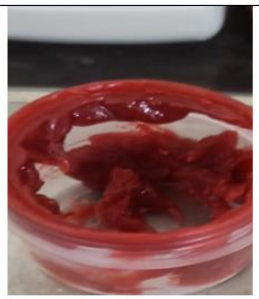
Figure 1: showing Densitogram Scanning was at 254nm.

Track	Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %	Assigned substance
1	1	0.00 Rf	8.6 AU	0.04 Rf	18.8 AU	1.46 %	0.05 Rf	5.5 AU	409.9 AU	0.96 %	unknown *
1	2	0.12 Rf	12.8 AU	0.17 Rf	33.8 AU	13.51 %	0.25 Rf	4.9 AU	3305.2 AU	11.29 %	unknown *
1	3	0.26 Rf	15.3 AU	0.26 Rf	01.7 AU	7.86 %	0.34 Rf	7.6 AU	4302.9 AU	0.12 %	unknown *
1	4	0.41 Rf	13.5 AU	0.47 Rf	02.1 AU	7.88 %	0.48 Rf	4.3 AU	3137.7 AU	7.38 %	unknown *
1	5	0.49 Rf	14.4 AU	0.53 Rf	95.4 AU	12.82 %	0.57 Rf	0.5 AU	8434.8 AU	9.84 %	unknown *
1	6	0.58 Rf	10.8 AU	0.62 Rf	85.9 AU	4.36 %	0.67 Rf	0.4 AU	7901.6 AU	8.58 %	unknown *
1	7	0.80 Rf	10.9 AU	0.81 Rf	54.2 AU	4.19 %	0.87 Rf	8.3 AU	1872.8 AU	4.40 %	unknown *
1	8	0.87 Rf	6.5 AU	0.91 Rf	02.7 AU	7.93 %	0.97 Rf	4.0 AU	3157.0 AU	7.42 %	unknown *
2	1	-0.01 Rf	5.0 AU	0.03 Rf	16.9 AU	3.69 %	0.04 Rf	5.0 AU	427.5 AU	1.88 %	unknown *
2	2	0.06 Rf	6.2 AU	0.14 Rf	25.9 AU	10.97 %	0.14 Rf	4.0 AU	1171.5 AU	12.54 %	unknown *
2	3	0.24 Rf	16.2 AU	0.27 Rf	34.3 AU	17.82 %	0.30 Rf	4.6 AU	1085.7 AU	10.16 %	unknown *
2	4	0.88 Rf	9.6 AU	0.89 Rf	30.7 AU	14.93 %	0.92 Rf	8.9 AU	617.7 AU	7.16 %	unknown *
2	5	0.94 Rf	2.2 AU	0.95 Rf	15.5 AU	2.59 %	1.00 Rf	1.9 AU	297.5 AU	8.26 %	unknown *

Figure no.2: showing Rf values.

Prapaundarikadya taila

Prapaundraikadya taila emulgel



Prapaundraikadya taila ointment

Figure 3: showing images of Prapaundarikadya taila and its modified form of emulgel and ointment.

DISCUSSION

The pharmaceutical process involved several key steps. First, the *Taila Murchana* procedure was undertaken, a classical Ayurvedic method to purify and enhance the properties of the oil. Following this, the preparation of *Prapaundarikadya Taila* was completed according to traditional guidelines. Finally, the *Prapaundarikadya Taila* was converted into ointment and emulgel forms, each offering distinct advantages. During the ointment preparation process, beeswax was added in varying ratios to the formulation in order to obtain a smooth and well-consistent ointment. In this study, the active ingredient was incorporated using the levigation method, based on a percentage w/w basis. Using this approach as a reference, the ointment was formulated through trial and error to achieve the desired consistency. which further promoted a smooth, homogeneous paste. The resulting ointment, characterized by its red color.

During the emulgel preparation, it began with the formulation of the gel base using Carbopol, ensuring a uniform mixture through constant stirring, which is crucial for achieving the desired viscosity. The pH adjustment with triethanolamine is essential for stabilizing the gel, contributing to the overall effectiveness of the emulgel. Subsequently, the preparation of the emulsion involved careful integration of both the aqueous and oil phases, with Tween 80 and Span 80 serving as emulsifiers. Heating these components to 70°C facilitates proper emulsification, ensuring that the oil phase is evenly distributed throughout the aqueous phase. The final emulgel, characterized by a peach color, is a blend of the gel and emulsion phases in a 1:1 ratio, yielding a product that combines the benefits of both formulations.

The ointment provided a thicker, more stable formulation for localized application, while the emulgel offered improved drug delivery through the skin, combining the benefits of both gel and emulsion. Both formulations aimed to retain the wound-healing properties of the original *Taila* while improving ease of application, stability, and absorption.

- Physical test shows *murchitha tila taila* was red in colour and *Prapaundarikadya taila* was in Dark red in colour with characteristic odour.use of *manjishta* and *Rakta Chandana* may be the reason for this colour.
- There was minimal difference in the refractive index between the raw, *Murchitha taila,* and *Prapaundarikadya Taila*, suggesting no significant change in their concentration or purity during processing. As Oil is denser than air, Refractive index is always more than one this is confirmed in this study.
- There was minimal change in the specific gravity across the oils. However, *Prapaundarikadya Taila* showed a slightly higher specific gravity compared to *Raw Tila Taila* and *Murchita Taila*, likely due to the solid extractives from the herbs added during the process.
- The pH values of the three oils, *Raw Tila Taila, Murchita Tila Taila, and Prapaundarikadya Taila*, are relatively close, ranging from 6.6 to 7.3. This indicates that all three oils exhibit a slightly acidic to neutral pH. A slightly acidic pH can be beneficial for skin health as it can help maintain the skin's natural acid mantle, which acts as a protective barrier against bacteria and fungi. However, a pH that is too acidic or too alkaline can disrupt the skin's natural balance and lead to irritation or dryness.
- The viscosity of the oils decreases from *Raw Tila Taila* to *Prapaundarikadya Taila*. This decrease in viscosity might influence the spreadability and absorption of the oils. Lower viscosity oils may penetrate the skin more easily, while higher viscosity oils may form a protective barrier.
- In this study, none of the three *Taila* samples showed signs of rancidity. All samples had a peroxide value of 0, indicating no primary oxidation had occurred, suggesting the oils were stable and free from oxidative degradation.
- The acid value measures the amount of carboxylic acid groups in compounds like fatty acids. It increases as triglycerides break down into fatty acids

and glycerol. A lower acid value indicates a reduced chance of decomposition, thus extending the oil's lifespan and enhancing its therapeutic value.In this study, *Prapaundarikadya Taila* had the lowest acid value compared to *Murchita Taila* and *Raw Tila Taila*, suggesting better stability.

- The higher saponification value of *Prapaundarikadya Taila* suggests a greater presence of short-chain fatty acids, which are absorbed more quickly, enhancing the oil's therapeutic efficacy
- In this study, tila taila and *Murchita Taila* had a higher iodine value than *Prapaundarikadya Taila*, suggesting it is more unsaturated and thus more prone to early rancidity. Typically, after the *Murchana* process, the iodine value increases, enhancing the oil's ability to extract beneficial components from added herbs like those in *Prapaundarikadya Taila*.
- The Loss on Drying (LOD) values for the three oils are relatively low, indicating minimal moisture content. This suggests that the oils have been properly processed and stored, reducing the risk of microbial growth and oxidation. Lower LOD values generally indicate better quality and stability of the oils.
- *Prapaundarikadya taila* ointment was red colour with characteristic odour.
- *Prapaundarikadya taila* Emulgel was peach colour with characteristic odour.
- The trial-and-error approach involved evaluating multiple formulations to identify the optimal one. In both ointment and emulgel trials, formulations were assessed based on parameters like appearance, pH, spreadability, extrudability, centrifugation, stability, washability, and viscosity. Formulations O3 and E3, which demonstrated superior physical and chemical properties, were further evaluated for their potential efficacy.
- Each formulation was tested three times, with the average taken for standardization parameters.
- There were no significant changes in the pH of formulations for 6 months of the stability study. It indicates that pH is maintained throughout the study. The pH of the *Prapaundarikadya taila* ointment was found to be in the range of 7.1 to 7.3, and the pH of the *Prapaundarikadya taila* emulgel was 6.5 to 7.1. Both the formulations showed a pH closer to skin pH.
- Here, each ointment was washable and emulgel was easily washable compared to ointment.
- The consistent application can enhance absorption and overall effectiveness, The spreadability of *Prapaundarikadya taila* ointment was 20 cm and the *Prapaundarikadya taila* emulgel was 27.8cm which indicates that emulgel shows better spreadability.
- The viscosity of *Prapaundarikadya taila* ointment was in 9400cps and *Prapaundarikadya taila* emulgel was 9586cps which indicates that the cream is easily spreadable by small amounts of shear.
- The tube extrudability of both the *Prapaundarikadya taila* ointment and emulgel was good.
- This is tested to assess their stability and phase separation behavior under centrifugal forces. Both *Prapaundarikadya taila* ointment and emulgel doesn't show any phase separation.
- The formulations were kept in stability chamber the temperature was maintained. The consistency, colour, homogeneity spreadability, pH washability of both samples did not undergo any changes for up to 6 months.
- HPTLC is the sophisticated analytical parameter for the evaluation of the herbal drugs. HPTLC can also serves as Fingerprinting technique for identification and quantification of the herbal and Herbo-mineral formulations. Through HPTLC technique major phytochemical present the drug or formulation can be estimated. It helps to find out the adulteration in the formulation and is used as a standard for the herbal compounds. The prepared drug was subjected to HPTLC fingerprinting at different wavelengths (254nm & 366nm). The Rf values observed indicates the presence of different components in the sample. The Rf values represent the relative distance travelled by the compounds in the sample compared to the solvent front. In this case, the very similar Rf values between the different samples suggest that the major chemical constituents and their relative proportions are quite similar. This indicates that the modification process used for the ointment and emulgel did not significantly alter the primary chemical profile of the original oil.
- The FT-IR of *murchitha tila taila* and and *Prapaundarikadya taila* shows the presence of hydroxyl group, carboxyl group, amine, alkenes, and phenol functional groups. The FT-IR of *Prapaundarikadya taila* ointment and *Prapaundarikadya taila* emulgel shows the presence of hydroxyl group, carboxyl group, amine, alkenes, and phenol functional groups in addition ointment and emulgel formulations suggests the presence of halo-compounds, which could be due to presence of excipients (intentional additions).

CONCLUSION

This study successfully modified the traditional Ayurvedic formulation, *Prapaundarikadya Taila*, into two modern dosage forms: ointment and emulgel. The aim was to enhance the ease of application, patient compliance, and potentially improve drug delivery while preserving the therapeutic efficacy of the original formulation. The physico-chemical evaluation of the modified formulations demonstrated desirable characteristics for topical application, including acceptable pH, spreadability, and stability. The HPTLC and FTIR analysis confirmed the presence of key phytoconstituents in both the modified and original formulations, suggesting that the modification process did not significantly alter the primary chemical profile.

The ointment, a thicker formulation, is suitable for localized application, while the emulgel, with its enhanced skin penetration properties, may offer improved drug delivery. Both formulations have the potential to provide effective wound healing benefits while addressing the limitations associated with the traditional oil-based Taila. This research provides a foundation for the development of standardized, efficacious, and patient-friendly formulations based on traditional Ayurvedic principles.

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