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A Pharmaceutico – Analytical Study of Balaguduchyadi Taila

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ABSTRACT

Bhaishajya Kalpana, a fundamental branch of Ayurveda, deals with the pharmaceutical principles and techniques involved in the preparation of various Ayurvedic medicines. Among the different dosage forms, *Sneha Kalpana* holds considerable therapeutic importance owing to its ability to facilitate the extraction and incorporation of active constituents into lipid-based media. *Taila Kalpana*, a *subtype of Sneha Kalpana*, involves the processing of medicinal ingredients with an appropriate oil base to enhance the therapeutic potential, absorption and localized application of the formulation. *Balaguduchyadi Taila* is one such effective and unique formulation mentioned in Sahasrayoga, *Taila Prakarana.* Here an attempt is made to study the Pharmaceutical and Analytical aspects *Balaguduchyadi Taila*.

KEY WORDS: *Balaguduchyadi Taila,* Pharmaceutical study, Analytical study.

I. INRODUCTION:

Bhaishajya Kalpana is the branch of Ayurveda concerned with the preparation of medicines using traditional pharmaceutical principles. The five basic dosage forms (*Panchavidha Kashaya Kalpana)* are *Swarasa, Kalka, Kwatha, Hima* and *Phanta.* To improve stability and shelf life, modified preparations called *Upakalpanas*, such as *Avaleha*, *Sandhana* and *Sneha Kalpana*, are developed.

Sneha Kalpana involves preparing lipid-based medicines by processing *Sneha Dravya* with *Kalka, Kwatha* or other liquid media under controlled heating. It includes *Ghrita Kalpana* and *Taila Kalpana* and supports different modes of administration, including *Pana, Abhyanga, Nasya* and *Basti. Taila Kalpana* is particularly important for incorporating medicinal constituents into an oily medium, supporting drug delivery, nourishment and healing.

The pharmaceutical and analytical study plays a vital role in the preparation and standardization of Ayurveda formulations. The pharmaceutical study involves the systematic preparation of the formulation according to classical references, including the selection of ingredients, their proportions, processing techniques and heating conditions. The analytical study evaluates the physicochemical characteristics and quality parameters of the finished product to ensure its identity, purity, consistency and reproducibility. Together, these studies provide a scientific basis for quality control and standardization, supporting the safety and therapeutic reliability of Ayurveda formulation.

This study is undertaken to study the pharmaceutical and analytical studies of *Balaguduchyadi Taila*[1].

AIM:

The study aimed to perform the pharmaceutical and analytical studies of *Balaguduchyadi Taila.*

OBJECTIVES:

1. To study the pharmaceutical aspects of *Balaguduchyadi Taila.*
2. To study the analytical aspects of *Balaguduchyadi Taila.*

II. MATERIALS AND METHODS

TABLE 1: FORMULATION COMPOSITION OF *BALAGUDUCHYADI TAILA*

DRUGS	BOTANICAL NAME	FAMILY	PART USED	QUANTITY
Bala[2]	*Sida cardifolia* Linn.	Malvaceae	Root	384 g.

International Journal of Pharmaceutical research and Applications
Volume 11, Issue 6, Nov.-Dec.2026, pp:126-133 www.ijprajournal.com ISSN:2456-4494

Guduchi[3]	*Tinospora cordifolia* willd.	Menispermaceae	Stem	384 g.
Chandana[4]	*Santalum alba* Linn.	Santalaceae	Heartwood	48 g.
Usheera[5]	*Andropogon muricatus* Retz.	Gramineae	Root	48 g.
Madhuyashti[6]	*Glycerrhiza glabra* Linn.	Leguminoceae	Root	48 g.
Musta[7]	*Cyprus rotundus* Linn.	Cyperaceae	Rhizome	48 g.
Tila Taila[8]	*Sesamum indicum* Linn.	Pedaliaceae	Seed	768 g.
Go-Ksheera	-	-	-	1536 ml.

Equipment used:
Khalva Yantra, Gas stove, Vessels, Spoon, Spatula, Measuring jar, *Kora* cloth.

METHOD OF PREPARATION OF *BALAGUDUCHYADI TAILA*

❖ ***Poorva Karma***

1. Preparation of *Dravadravya (Bala-Guduchi Kwatha)*

Table No. 2: Formulation Composition of *Bala-Guduchi Kwatha*

Sl. No.	Ingredients	Quantity
1.	*Bala Moola*	385 g
2.	*Guduchi Kanda*	385 g
3.	Water	6160ml

- The raw drugs were made into coarse powder form and soaked in water overnight in a stainless steel vessel.
- Next day morning it is kept for boiling and it is reduced to 1540ml.
- *Go-Ksheera* was measured and kept ready.

2. Preparation of *Kalka*

Sl. No.	Ingredients	Quantity
1.	*Chandana*	1 *Pala*
2.	*Usheera*	1 *Pala*
3.	*Yashtimadhu*	1 *Pala*
4.	*Musta*	1 *Pala*
5.	Water	100ml

Table No. 3: Ingredient Composition of *Kalka*

- All the drugs were taken, pounded well in *Kalva Yantra* and the *Kalka* was prepared.

PRADHANA KARMA

Preparation of *Taila*

Day 1:

- 768ml of *Tila Taila* was taken in a wide mouthed stainless steel vessel and heated over mild flame to remove the moisture content.
- 192g of prepared *Kalka* was added to *Taila* from the sides of the vessel.
- 1536ml of prepared *Kashaya* was added followed by 1536ml of *Go- Ksheera* was added to *Taila*.
- The mixture was stirred continuously in mild flame till the appearance of boiling and the stove was switched off.

Day 2:

- Next day the heating process was continued under mild flame with continuous stirring.
- Boiling was continued for about 70 minutes and the stove switched off.

International Journal of Pharmaceutical research and Applications
Volume 11, Issue 6, Nov.-Dec.2026, pp:126-133 www.ijprajournal.com ISSN:2456-4494

Day 3:

- The heating process was continued under mild flame till the appearance of *Sneha Siddhi Lakshanas*.

PASHCHAT KARMA

- **Filtering and Storage**
  After confirming the *Sneha Siddhi Lakshanas*, the stove was turned off and the *Taila* was filtered through a clean kora cloth. After cooling, the final product obtained was measured and stored in an air tight container.
  Precautions:
- The vessel used for the process should be clean and of adequate size, in order to avoid spilling of *Taila* because of excess foaming during the process.
- *Mandagni* should be maintained throughout the process.
- Continuous stirring should be done to avoid the sticking of *Kalka* to the vessels.
- Timely performance of the *Paka Siddhi Parikshas* and observations of *Siddhi Lakshanas*.

Taila Paka Siddhi Lakshana

1. Frothy appearance of *Taila* which indicated the beginning of *Paka*.
2. Absence of crackling sound when the *Kalka* was exposed to fire.
3. *Kalka* was made into wick on rolling it between the fingers.
4. *Gandha, Varna* of *Taila* was observed.

INDICATION:

- *Vatarakta, Raktapitta, Shiroroga.*

MODE OF ADMINISTRATION:

- External application

III. OBSERVATION AND RESULTS

Table 4: Chart explaining the time and observation during the preparation of *Balaguduchyadi Taila*

DAY 1: Sl. No.	TIME	OBSERVATION
1.	2:23 pm	Addition of *Taila* to a wide mouthed stainless steel vessel
2.	2:24 pm	Oil was slightly warmed and had a golden yellow color
3.	2:26 pm	Addition of *Kalka* ,appearance of froth was observed.
4.	2:28 pm	*Dravadravya*, *Kwatha* was added and the color turned brownish yellow
5.	2:40 pm	Frothy layer was observed
6.	2:45 pm	Boiling started, creamish color was observed
7.	2:50 pm	Creamish layer with oil globule was observed
8.	2:55 pm	Evaporation was observed and boiling continued
9.	3:28 pm	Bubbles were noticed
10.	3:32 pm	Light brown color was observed
11.	3:34 pm	Heating was stopped
12.	3:34 pm	Total time duration : 1 hour 10 minutes

Day 2	TIME	OBSERVATION
1.	2:05 pm	Before igniting the fire, supernatant layer of *Taila* was observed, after stirring it was yellowish in color
2.	2:15 pm	Fire was ignited and maintained on *Mandagni*
3.	2:25 pm	Tiny bubbles began to form, slight frothing was observed
4.	2: 43 pm	Evaporation was observed and Bigger bubbles began to appear
5.	2:45 pm	Continuous stirring was done
6.	2:47 pm	Enhancement of aroma was observed
7.	2:50 pm	Stove was turned off
8.	2:50 pm	Total time taken : 45 minutes

International Journal of Pharmaceutical research and Applications
Volume 11, Issue 6, Nov.-Dec.2026, pp:126-133 www.ijprajournal.com ISSN:2456-4494

DAY 3 :	TIME	OBSERVATION
1.	9: 42 am	Fire was ignited and boiling was started
2.	9:46 am	Tiny bubbles with slight frothing was observed
3.	9:56 am	Continuous stirring was done and enhancement of aroma was observed
4.	10:15 am	Profuse boiling started, *Kalka* was sticking to vessel
5.	10:19 am	*Taila* was separating from *Kalka*
6.	10:25 am	*Amapaka Lakshana* – dense fumes were observed and brownish *Kalka* was becoming bolus
7.	10:35 am	*Mridupaka Lakshana* – continuous stirring was done, *Vartivat Kalka* was formed
8.	10:48 am	When *Kalka* was put on fire, *Kalka* burnt without any crackling sound
9.	10:50 am	Stove was turned off
10.	10:50 am	Total time taken – 1 hour 8 minutes

Results of Pharmaceutical study

Table No. 5: Quantity of *Balaguduchyadi Taila*

Parameters	*Balaguduchyadi Taila*
Quantity of *Kalka*	192 g
Quantity of *dravadravya*	3072ml
Quantity of *Taila* taken	768ml
Quantity of *Taila* obtained	630 ml
Loss of *Taila* in ml	138 ml
Loss of *Taila* in %	18%

Results of Analytical study

Table No. 6: Organoleptic characters of *Balaguduchyadi Taila*

Organoleptic characters	*Balaguduchyadi Taila*
Color	Golden yellow
Odour	Characteristic odour
Appearance	Viscous liquid
Touch	Unctuous

Table No. 7: Results of physico - chemical analysis of *Balaguduchyadi Taila*

Sl. No.	Parameters	Results
1.	Acid value	3.41
2.	Viscosity	45.38 cSt
3.	Rancidity	Not rancid
4.	Specific gravity	0.916
5.	Iodine value	82.54
6.	Saponification value	352.88
7.	Peroxide value	1.63
8.	Refractive index	1.473
9.	Spreadability	96.87Cm / gm
10.	Globule size	No emulsion, suspended particles observed

International Journal of Pharmaceutical research and Applications
Volume 11, Issue 6, Nov.-Dec.2026, pp:126-133 www.ijprajournal.com ISSN:2456-4494

Table No. 8: Detailed peak report of GC- MS of *Balaguduchyadi Taila*

Sl. No.	R. Time	Compound name	Formula	Molecular weight	Peak area %	CAS registry No.
1.	5.417	Hexanoic acid, methyl ester	$C_7H_{14}O_2$	130.18g/mol	0.10	106-70-7
2.	8.440	Octanoic acid, methyl ester	$C_9H_{18}O_2$	158.24g/mol	0.68	111-11-5
3.	11.485	Decanoic acid, methyl ester	$C_{11}H_{22}O_2$	186.29g/mol	0.67	110-42-9
4.	18.362	Dodecanoic acid, methyl ester	$C_{13}H_{26}O_2$	214.34g/mol	4.83	111-82-0
5.	26.304	Methyl tetradecanoate	$C_{15}H_{30}O_2$	242.4g/mol	2.90	124-10-7
6.	27.365	Isopropyl myristate	$C_{17}H_{34}O_2$	256.4g/mol	0.34	110-27-0
7.	28.025	9-octadecenoic acid(Z),- Methyl ester	$C_{19}H_{36}O_2$	270.5g/mol	0.43	112-62-9
8.	28.170	Tetradecanoic acid ,12-methyl-, methyl ester	$C_{16}H_{32}O_2$	296.5g/mol	12.23	5129-60-2
9.	28.670	9-octadecenoic acid(Z),- Methyl ester	$C_{19}H_{36}O_2$	296.48g/mol	0.09	112-62-9
10.	28.789	Pentadecanoic acid,14- methyl-, methyl ester	$C_{17}H_{34}O_2$	270.45g/mol	0.17	5129-60-2
11.	29.130	Hexaethylene glycol	$C_{12}H_{26}O_7$	282.33g/mol	0.06	2615-15-8
12.	29.262	9-octadecanoic acid, methyl ester(E)	$C_{19}H_{36}O_2$	296.49g/mol	65.60	1937-62-8
13.	29.346	Tetradecanoic acid, 12-methyl-,methyl ester	$C_{16}H_{32}O_2$	256.42g/mol	8.95	5129-66-8
14.	29.466	9,11-octadecadienoic acid, methyl ester (EE)	$C_{19}H_{34}O_2$	294.47g/mol	0.09	13038-47-6
15.	30.300	9,12-octadecadienoyl chloride,(Z,Z)	$C_{18}H_{31}ClO$	310.89g/mol	0.12	7459-33-8
16.	30.423	9-octadecenoic acid(Z)-, methyl ester	$C_{19}H_{36}O_2$	298.49g/mol	0.56	112-62-9
17.	30.565	Heneicosanoic acid, methyl ester	$C_{22}H_{44}O_2$	340.58g/mol	1.51	6064-90-0
18.	32.044-	13- Docosenoic acid, methyl ester(Z)	$C_{23}H_{46}O_2$	352.59g/mol	0.16	1120-34-9
19.	32.234	Docosanoic acid, methyl ester	$C_{23}H_{46}O_2$	354.61g/mol	0.31	929-77-1
20.	34.721	Heptacosanoic acid, methyl ester	$C_{28}H_{56}O_2$	424.74g/mol	0.18	55682-91-2

IV. Discussion on Pharmaceutical study

Balaguduchyadi Taila is a classical Ayurvedic formulation mentioned in Sahasrayoga, *Taila Prakarana*. *Bala* (Sida cordifolia) and *Guduchi* (Tinospora cordifolia) are used as *Kwatha Dravya*, while *Chandana* (Santalum album), *Usheera* (Vetiveria zizanioides), *Yashtimadhu* (Glycyrrhiza glabra) and *Musta* (Cyperus rotundus) serve as *Kalka Dravya*. *Go-Ksheera* is used as *Drava Dravya* along with the herbal decoction and *Tila Taila* serves as *Sneha Dravya*. The formulation was prepared following the classical ratio of *Kalka, Sneha* and *Drava Dravya* (1:4:16).

Day 1: *Tila Taila* was gently heated, followed by the addition of *Kalka*, which produced mild frothing. The addition of *Bala-Guduchi Kwatha* and *Go-Ksheera*

International Journal of Pharmaceutical research and Applications
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changed the mixture to a deeper yellow. *Mandagni* heating for approximately 70 minutes resulted in gradual evaporation, bubbling and development of characteristic color and aroma.

Day 2: Small bubbles and frothing appeared within five minutes of heating, followed by moisture evaporation and a light-brown color. The progressive development of aroma and changes in appearance indicated the integration of herbal constituents into the oil.

Day 3: *Taila* separation was observed at approximately 09:42 a.m., followed by dense fumes indicating *Ama Paka Lakshana* and crackling sounds associated with moisture reduction. The *Kalka* attained a semi-solid, *Vartivat* consistency, indicating *Madhyama Paka*. Heating was stopped at 10:50 a.m., after approximately 68 minutes, based on the observed *Paka Lakshanas*.

Overall, the progressive changes in color, aroma, frothing, moisture evaporation and *Kalka* consistency helped assess the stages of *Taila Paka* and determine the completion of the pharmaceutical process.

Discussion on Analytical Study

❖ **Discussion on Organoleptic Characters**

Balaguduchyadi Taila exhibited a golden-yellow color, characteristic odour and viscous, unctuous consistency.

❖ **Discussion on Physico-Chemical Analysis**

The acid value was 3.41, viscosity 45.38 cSt and peroxide value 1.63, with the sample reported as non-rancid. Specific gravity and refractive index were 0.916 and 1.473, respectively. The iodine value was 82.54 and the saponification value was 352.88, Spreadability was 96.87 cm^3/g. Microscopic examination showed suspended particles without emulsion formation.

❖ **Discussion on GC-MS report**

GC–MS analysis revealed predominantly fatty acid methyl esters. The major constituent was 9-octadecenoic acid methyl ester (E) (65.60%), followed by other constituents reported at 12.23%, 8.95%, 4.83%, and 2.90%. These findings provide preliminary information on the chemical composition of *Balaguduchyadi Taila.*

V. CONCLUSION

Balaguduchyadi Taila is a classical formulation mentioned in Sahasrayoga, *Taila Prakarana*, indicated in conditions such as *Vatarakta, Raktaraktita, Shiro Roga* and *Vata-Pitta Roga*.

The pharmaceutical study revealed a total yield of 630 ml, with 18% loss and a preparation time of 3 hours and 5 minutes.

Analytical evaluation demonstrated characteristic organoleptic properties, with physicochemical parameters including acid value, viscosity, specific gravity, iodine value, saponification value, peroxide value and refractive index providing a profile for quality assessment.

GC–MS analysis identified several fatty acid esters, with 9-octadecenoic acid methyl ester (E) as the predominant detected constituent.

Overall, the study provides preliminary pharmaceutical and analytical data to support the characterization and further standardization of *Balaguduchyadi Taila.*

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Volume 11, Issue 6, Nov.-Dec.2026, pp:126-133 www.ijprajournal.com ISSN:2456-4494

Photographs showing the preparation of *Balaguduchyadi Taila*



1. Ingredients



2. Addition of *Taila*



3. Addition of *Kalka*



4. Addition of *Kashaya*



5. Addition of *Go-Ksheera*



6. continuous stirring



7. checking for temperature



8. continuous stirring



9. Separation of *Taila*



10. *Phenodhama* in *Taila*



11. *Vartivath* in *Kalka*



12. *Shabdahani*



13. Measured



14. stored in an air tight container

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