Comparative Pharmaceutico-Analytical Study of Pinda Taila And Khajita Pinda Taila

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Abstract

Background: Ayurvedic classics have explained standards mainly based on the physical parameters which can be termed as qualitative analysis. With the raise in the graph of development of the science, many procedures and tests were introduced to help in the evaluation of properties and qualities of Ayurvedic drugs. Aims and objectives: To study the organoleptic characters, and evaluation of Pinda Taila and Khajita Pinda Taila in terms of Physico-Chemical tests and Chromatographical parameters. Materials and methods: The preparation of the two samples of Pinda Taila and Khajita Pinda Taila was carried out following the method mentioned in Charaka Samhita¹. The study of the organoleptic characters and various physico-chemical analyses were carried out at S.D.M Centre for Research in Ayurveda and Allied Sciences, Udupi. Conclusion: In the analytical study, Khajita Pinda Taila was assured to be water in oil type of emulsion. Whereas, Pinda Taila showed all the qualities of an ideal oil. Keywords: Pinda Taila; Khajita Pinda Taila; Standardization; Analytical Study.

Introduction:

The action of any drug is based upon many factors such as the selection of the genuine crude drug, the standard operative procedures and finally the storage of the prepared medicines. If we look into the above factors we can infer that the potency of any medicine depends upon the quality, strength and purity of the crude drugs that are used in the preparation of a formulation. Also, the Samskaras (Pharmacological procedures) adopted in the course of the preparation of a formulation imparts certain qualities to the product. Hence utmost care is crucial during the preparation along with proper supervision and assessment of the quality at various stages. This evaluation should begin right from the crude drug to the process standardization and ultimately testing the final product for the quality standards. Ayurvedic classics have explained standards mainly based on the physical parameters which can be termed as qualitative analysis. With the raise in the graph of development of the science, many procedures and tests were introduced to help in the evaluation of properties and qualities of Ayurvedic drugs. These tests mainly concentrated on the quantitative aspect of standardization making it easier for any lay person to understand the quality, purity and strength of the product. Hence this study was taken up to standardize the formulations Pinda Taila and Khajita Pinda Taila through analytical parameters.

Methodology

Aims and objectives

- To study the organoleptic characters and comparative evaluation of Pinda Taila and Khajita Pinda Taila in terms of Physico-Chemical tests and Chromatographical parameters.
Objectives:
- Assessment of organoleptic characters of Pinda Taila and Khajita Pinda Taila.
- Comparative Physico-chemical evaluation of the two samples, Pinda Taila and Khajita Pinda Taila respectively on the following parameters:
  1. Refractive index at 25°C
  2. Specific Gravity
  3. Acid value
  4. Saponification value
  5. Iodine value
  6. Unsaponifiable matter
  7. Peroxide value
  8. Rancidity
  9. Viscosity
  10. HPTLC for unsaponifiable matter

Pharmaceutical Study of Pinda Taila and Khajita Pinda Taila

1. Collection of raw drug
The raw drugs required for the study were collected from SDM Ayurveda Pharmacy, Kuthpady, Udupi. The Tila Taila (Sesame oil) required for the study was obtained locally from Udupi.

2. Pharmaceutical preparation of Pinda Taila and Khajita Pinda Taila:
The preparation of the formulations was carried out in the practical laboratory, Department of Rasashastra and Bhaishajya Kalpana, SDM College of Ayurveda, Udupi. The preparation of the two samples of Pinda Taila and Khajita Pinda Taila was carried out following the method mentioned in Charaka Samhita. Initially Tila Taila Murchana Samskara (purificatory process) was carried out to remove the Ama Dosha (raw impurities) and impart pleasant colour to the oil. The initial volume of Tila Taila taken was 12lts and oil obtained after Murchana Samskara was 10.5lts. The Pinda Taila preparation was carried out with 10lts of Murchita Tila Taila and Manjishta (Rubia cardifolia), Sariva (Hemidisimus indicus), Madhuchishta (Bee wax) and Sarjarasa (Shorea robusta) as Kalka Dravya (paste). The final quantity of Pinda Taila obtained was 8lts which was divided into two equal parts and used to prepare Khajita Pinda Taila with the addition of water and churning process.

Analytical Study
The study of the organoleptic characters and various physico-chemical analyses were carried out at S.D.M Centre for Research in Ayurveda and Allied Sciences, Udupi. Organoleptic characteristics like colour, odour, taste and consistency were recorded along with the evaluation of Physico-chemical parameters mentioned above by following standard procedures.

- **Color:** The color of Pinda Taila was dark red. This could be due to the presence of Manjishta both as a Murchana Dravya as well as an ingredient in Pinda Taila. The color of Khajita Pinda Taila was light brown in color. This may be due to the addition of water for churning process.

- **Appearance:** The appearance of Pinda Taila was observed to be like thick liquid. This was because of the presence of Sarjarasa (gum resin) and Madhuchishta (Bee wax) which helps to solidify on cooling. The Khajita Pinda Taila looked more like an emulsion than oil with small water globules scattered in it. This was due to the churning process which contributed in the mixing of oil and water.
• **Consistency:** Pinda Taila was more towards Semi-liquid in consistency and oleaginous whereas Khajita Pinda Taila was more of buttery consistency with sticky nature. This may be due to the nature of the oil used as base and buttery consistency may be because of the mixing of oil and water. The organoleptic characteristics of the two samples are shown in Table 1.

![Table 1: Organoleptic characters of Pinda Taila and Khajita Pinda Taila](image)

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Parameters</th>
<th>Pinda Taila</th>
<th>Khajita Pinda Taila</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Colour</td>
<td>Brownish-red</td>
<td>Light brown</td>
</tr>
<tr>
<td>02</td>
<td>Odour</td>
<td>Characteristic (Madhuchishta-Bee wax)</td>
<td>No specific odour</td>
</tr>
<tr>
<td>03</td>
<td>Taste</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>04</td>
<td>Appearance</td>
<td>Thick Liquid</td>
<td>Emulsion</td>
</tr>
<tr>
<td>05</td>
<td>Consistency</td>
<td>Semi-liquid</td>
<td>Buttery</td>
</tr>
</tbody>
</table>

**Results Of Analytical Study:**

**Table 2: Results of standardization parameters of Pinda Taila and Khajita Pinda Taila**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Results</th>
<th>n = 3</th>
<th>%w/w</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pinda Taila</td>
<td>Khajita Pinda Taila</td>
<td></td>
</tr>
<tr>
<td>Refractive index</td>
<td>1.47729</td>
<td>1.47479</td>
<td></td>
</tr>
<tr>
<td>Specific gravity</td>
<td>0.9463</td>
<td>1.0035</td>
<td></td>
</tr>
<tr>
<td>Acid value</td>
<td>3.82</td>
<td>5.42</td>
<td></td>
</tr>
<tr>
<td>Saponification value</td>
<td>50.97</td>
<td>113.87</td>
<td></td>
</tr>
<tr>
<td>Iodine value</td>
<td>94.36</td>
<td>62.47</td>
<td></td>
</tr>
<tr>
<td>Unsaponifiable matter (%)</td>
<td>9.97</td>
<td>5.92</td>
<td></td>
</tr>
<tr>
<td>Peroxide value</td>
<td>0.2</td>
<td>0.79</td>
<td></td>
</tr>
<tr>
<td>Rancidity</td>
<td>Fat is not oxidized</td>
<td>Fat is not oxidized</td>
<td></td>
</tr>
</tbody>
</table>

**Discussion:**

The standard value for refractive index given for Pinda Taila is 1.4670 to 1.4710$^3$. The refractive indices of PT and KPT samples were noted as 1.47729 and 1.47479 respectively. From the above information, we can infer that refractive index of both the samples are slightly higher than the standard value. This may be because Murchita Tila Taila was used for the preparation of Pinda Taila. The increase in refractive index after Murchana Samskara, may be because of the addition of Phytoconstituents of the Murchana drugs used. Out of the two samples, Khajita Pinda Taila had lower refractive index than that of Pinda Taila. This could be because of the loss of transparency of the oil due to the addition of water during its preparation.

The standard acid value mentioned for Pinda Taila is said to be not more than 5$^4$. Higher the acid values, higher will be the amount of free fatty acids. So in this study Pinda Taila showed less acid value than Khajita Pinda Taila. This may be because of absence of moisture content in Pinda Taila whereas the addition of water in Khajita Pinda Taila would have lead to the high acid values. The addition of water increases the chances of rancidity in oil and in turn may increase the acid value.

Saponification value and molecular weight of oil are inversely proportional to each other. The increase in saponification value is due to the higher content of low molecular weight fatty acids. So, oil with low molecular weight fatty acids is absorbed faster. The standard saponification value for Pinda Taila is said to be 173 to 189$^5$. The saponification values of PT and KPT was noted as 50.7 and 113.87 respectively. The samples of both the oils show less values of saponification than the standard.
The sample of Khajita Pinda Taila was observed to have high saponification value than Pinda Taila. Hence, it can be inferred that Khajita Pinda Taila might have higher rate of absorption than Pinda Taila.

Iodine value shows the degree of unsaturation in fats and is directly proportional to the amount of unsaturated fatty acids. Higher the iodine value higher is degree of unsaturation. Greater the degree of unsaturation, higher will be the possibility of the oils getting rancid. The standard value for iodine for Pinda Taila is given as 100 to 110\textsuperscript{6}. The Iodine value of PT and KPT were 94.36 and 62.47 respectively. Both samples of oils have shown less iodine value than the standard. This may imply decreased degree of unsaturation which in turn means less chances of getting rancid and longer shelf life. Khajita Pinda Taila was observed to have less Iodine value than Pinda Taila. This may imply lower degree of unsaturation and minimal chances of rancidity.

Unsaponifiable matter\textsuperscript{7} indicates the non fatty matter or the substance devoid of fat or oil. The unsaponifiable matter of PT and KPT was recorded as 9.97 and 5.92 respectively. When the values of two samples of oils were compared, it was found that the Unsaponifiable matter of Khajita Pinda Taila was less than that of Pinda Taila. This implies that the fatty matter in Khajita Pinda Taila is less than that of Pinda Taila. This may be because of the addition of water during its preparation.

Peroxide value\textsuperscript{8} determines the level of oxidation of oil. Higher the value, higher is the oxidation level. The peroxide values of PT and KPT were noted as 0.2 and 0.79 respectively. Khajita Pinda Taila had slightly higher peroxide value than Pinda Taila. This may be due to the addition of water while preparing Khajita Pinda Taila which may have lead to the hydrolysis of the lipid components.

When both the samples of Pinda Taila and Khajita Pinda Taila were assessed for rancidity, there was no colour change observed indicating that the oils did not undergo oxidation. This shows that both the samples had not turned rancid.

Specific Gravity of a substance shows the density. The standard value of specific gravity for Pinda Taila is said to be 0.92\textsuperscript{9}. PT and KPT had specific gravity as 0.9463 and 1.0035 respectively. Khajita Pinda Taila showed higher value. This may be due to the addition of water in the preparation whose specific gravity is higher than other liquids.

Viscosity\textsuperscript{10} shows the resistance to flow of a substance. When both the samples of oil were tested for their viscosity, it was found that neither of the oils moved from point ‘A’ to point ‘B’ in the viscometer. This shows high resistance towards flow of both the oils. This may be because of the semi-solid nature of both the oils due to the addition of Sarjarasa and Madhuchishta.

Physical Stability Test

Physical stability tests like dilution test, conductivity test, dye test etc are carried out to identify the type of emulsion i.e. oil in water (O/W) or water in oil (W/O) since both the emulsions look similar on appearance.

1. **Dilution test**\textsuperscript{11}
   Dilution test was carried out according the procedure explained in the analytical study and Khajita Pinda Taila was identified as Water in oil (W/O) emulsion.

2. **Conductivity test**\textsuperscript{12}
   Conductivity test was carried out on Khajita Pinda Taila the multimeter did not show ant reading, as oil is not a good conductor of electricity. Hence it can be concluded that Khajita Pinda Taila is water in oil emulsion because electric current did not pass through it or the multi-meter did not show any reading as oil is the continuous phase and water the dispersed phase.

3. **Dye test**\textsuperscript{13}
   Dye test in both water soluble dye(Amaranth) and oil soluble dye(Sudan) showed Khajita Pinda Taila to be a water in oil emulsion.
High Performance Thin Layer Chromatography

**Rf Values of Pinda Taila and Khajita Pinda Taila:**

1. **Photo documentation at 254nm wavelength**
   HPTLC analyses of Pinda Taila at 254 nm wavelength showed three spots at Rf values 0.40, 0.67 and 0.85 and Khajita Pinda Taila also showed three spots at Rf values 0.40, 0.67 and 0.85. This is because of the similarity in ingredients used in the preparation of Pinda Taila and Khajita Pinda Taila.

2. **Photo documentation at 366nm wavelength**
   HPTLC analyses of Pinda Taila and Khajita Pinda Taila at 366nm wavelength showed eight common spots at Rf values 0.37, 0.3, 0.60, 0.65, 0.76, 0.86 and 0.91. These common spots indicate the similarity in the constituents of both oils.

3. **Photo documentation After Derivatisation**
   HPTLC analyses of Pinda Taila after derivitisation showed four spots at Rf values 0.39, 0.59, 0.66 and 0.70 whereas Khajita Pinda Taila showed six spots at Rf values 0.39, 0.59, 0.65,0.70, 0.86 and 0.93. Both the oils showed four common spots and Khajita Pinda Taila showed two extra spots.

**Densitometric Scan**

The densitometric scan at short UV of 254nm of Pinda Taila showed 12 peaks corresponding to different phyto-constituents among which 0.71(56.58%) and 0.95(6.81%) were prominent with maximum percentage area whereas densitometric scan of Khajita Pinda Taila showed 18 peaks corresponding to different phyto-constituents among which 0.70(40.48%) and 0.91(25.58%) were prominent with maximum percentage area.

The densitometric scan at long UV of 366nm of Pinda Taila showed 4 peaks corresponding to different phyto-constituents among which 0.80(41.62%) and 0.93(26.72%) were prominent with maximum percentage area whereas densitometric scan of Khajita Pinda Taila at 366nm showed only 2 peaks corresponding to different phyto-constituents with 0.82(65.40%) and 0.37(34.60%) having maximum percentage area. This reduction in the peaks may due to the transformation of phyto-constituents due to the Manthana Samskara in Khajita Pinda Taila.

The densitometric scan at of 620nm of Pinda Taila showed 7 peaks corresponding to different phyto-constituents among which 0.55(44.61%) and 0.77(18.50%) were prominent with maximum percentage area whereas densitometric scan of Khajita Pinda Taila at 620nm also showed 7 peaks corresponding to different phyto-constituents among which 0.55(45.26%) and 0.73(33.12%) were prominent with maximum percentage area.

**Conclusion**

In the analytical study, Khajita Pinda Taila was assured to be water in oil type of emulsion through different analytical parameters carried out such as, dilution test, conductivity test and dye solubility test. Whereas, Pinda Taila showed all the qualities of an ideal oil when tested through parameters like, refractive index, viscosity, peroxide value, saponification value, iodine value, acid value, specific gravity, unsaponifiable matter and HPTLC analysis.

**Acknowledgement:**

The authors are grateful to the research officer, SDM Centre for Research in Ayurveda and Allied Sciences, Udupi for timely conduction of analytical tests.

**References**


PICTURES OF ANALYTICAL STUDY
CONDUCTIVITY TEST

Fig. 1. CONDUCTIVITY TEST IN WATER
Fig. 2. CONDUCTIVITY TEST IN PLAIN OIL
Fig. 3. CONDUCTIVITY TEST IN PINDA TAILA

Fig. 4. CONDUCTIVITY TEST IN KHAJITA PINDA TAILA

PICTURES OF ANALYTICAL STUDY

DYE TEST

AMARANTH

SUDAN

Fig. 5. PINDA TAILA

Fig. 6. PINDA TAILA

Fig. 7. KHAJITA PINDA TAILA

FIG. 8. KHAJITA PINDA TAILA
PICTURES OF ANALYTICAL STUDY
HIGH PERFORMANCE THIN LAYER CHROMATOGRAPHY

<table>
<thead>
<tr>
<th>Track</th>
<th>Sample</th>
<th>Volume</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Pinda taila</td>
<td>3µl</td>
</tr>
<tr>
<td>2</td>
<td>Khajita pinda taila</td>
<td>3µl</td>
</tr>
<tr>
<td>3</td>
<td>Pinda taila</td>
<td>6µl</td>
</tr>
<tr>
<td>4</td>
<td>Khajita pinda taila</td>
<td>6µl</td>
</tr>
<tr>
<td>5</td>
<td>Pinda taila</td>
<td>9µl</td>
</tr>
<tr>
<td>6</td>
<td>Khajita pinda taila</td>
<td>9µl</td>
</tr>
</tbody>
</table>

Solvent system – Toluene: Ethyl Acetate (9:1)

Fig.9. HPTLC photo documentation of chloroform extract of Pinda Taila, Khajita Pinda Taila