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Original Article

PHYSICO-CHEMICAL CHARACTERIZATION OF NATURAL HAEMATINIC, KASHISH (GREEN VITROL) FOR DIFFERENT PURIFICATION PROCEDURES.

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Abstract

Kashish is an important mineral of Indian Iatrochemistry. Chemically it is FeSO₄·7H₂O. In Ayurveda, Sodhana is not only just purification process for removing impurities, but also addition of some therapeutic properties to the drug. Kashish is one of the primitive drug of mineral origin with haematinic properties. It is purified by several methods, like pounding in bhringaraj (Eclipta alba) juice, pounding in lemon juice, sour gruel etc, according to several classical literature. In the present study, Organoleptic, physico-chemical, IR Spectroscopic evaluation was performed and an attempt was made to make comparative study between different sodhana processes and to identify their actual necessity (if any) to purify kashish.

Keywords: Bhringaraj, Kashish, Sodhana

Introduction

Ayurvediya Rasa-shatra deals with Indian system of Alchemy. Kashish is an important haematinic mineral which comes under Upasa group, it is found in nature and can be prepared artificially also. In Indian market, it is known as Hirakasa. Chemically it is FeSO₄·7H₂O. According to modern description, the mineral of iron sulphate is Melanite. It is of monoclinic and prismatic class, crystals are very rare, usually as earthy, fibrous, or capillary crusts or with efflorescence properties. Its crystal has distinct prismatic cleavages. According to Ayurveda, Kashish is, Kesya (Hair growth modulator), good for eyes, rakia vardhaka (haematinic), artava janana (Emmenagogue), carminative and digestive in nature. It is useful in diseases of eyes, skin, blood, heart, abdominal pain etc, but for proper usage and to make it free from impurities, different types of Sodhana (~purification) process is described in different classical texts, they are described as follows;

• With Bhringaraj (Eclipta alba); Kashish become suddha(purified) if it is subjected to sweadan(boiling) in the juice of bhringaraj[14]. However the process of keeping kashish immersed in the bhringaraj juice is more appropriate then subjecting it to boiling. In the process of boiling, kashish may not remain in the pouch for holding the kashish), because kashish may not remain in the pouch at all. Hence it is advised to give bhavana(drying through trituration) with bhringaraj swarasa[2],
• Bile juice and human menstrual blood; It can also be purified by the method of pounding in bile juice or menstrual blood[3].
• With Jambir(lemon) juice; according to Bhurutraja sundaram, kashish is milled to fine powder, and dried, it is then pounded in lemon juice for one day[4].
• Kanji (sour gruel); it can also be purified by pounded in sour gruel[5].

In the present study we made an attempt to study the efficacy and differences of different sodhana process by 1.Bhringaraj, 2.nimbu, and 3. Kanji, in respect to raw kashish, by organoleptical, physico-chemical, and spectroscopic analysis.

Methods

Gift sample of raw kashish is taken from Ayurvedic pharmacy, Faculty of Ayurveda, Banaras Hindu University and divided into four equal parts; three parts among them are purified by bhringaraj process, lemon juice process and kanji process respectively. For the ease of our work we named them as, RK (Raw kashish), SBP (sodhana with bhringaraj process), SLP (sodhana with
lemon juice process), and SKP (sodhana with kanji process). Kanji is prepared in our Rasa-Shastra laboratory on 15th November, 2011, at RGSC, BHU. The analytical profile is categorized in three different ways namely, Organoleptic evaluation, physico-chemical evaluation, Infra red spectroscopic evaluation.

**Organoleptic evaluation:** Color, odour and taste of RK, SBP, SLP, and SKP are verified and evaluated.

**Physico-chemical evaluation:** In chemical evaluation we made Assay study, Acidity, Copper content, presence of bisulphate (insoluble sulphates) in all the four samples.

- **Assay study:** It is assayed by oxidation-reduction type of reaction using 0.1 N KMnO₄ solutions.
  1 gram of sample is dissolved in 20 ml of dilute H₂SO₄, and then titrated with 0.1N KMnO₄. 2FeSO₄ +2KMnO₄+4H₂SO₄=K₂SO₄+2MnSO₄+Fe₂(SO₄)₃+4H₂O
  1 ml of 0.1 N KMnO₄=0.0291g of FeSO₄.7H₂O
- **Bisulphate investigation:** This is determined by viewing the turbidity by dissolving 1 g of sample in 2ml of freshly boiled water.
- **Presence of Copper:** 2 gram of samples is dissolved in 50 ml of water, followed by acidifying the solution with 1ml of dil.H₂SO₄, and then it is saturated by H₂S gas from Kipp’s Apparatus. No darkening of the solution should occur.
- **Acidity:** acidity is studied by Ph-meter.
- **Infra-red spectroscopical study:** The study was carried out by using, “Varian 640-IR instrument”.

**Reasults**

**Organoleptic evaluation:** distinct change in colour was observed (fig-1) after purification of the raw sample. All the four samples differ in texture, odour and taste, which was elaborately investigated (Table-1).

![Figure 1](image_url)

**Physico-chemical evaluation**

**Assay:** Assay means the percentage purity of the drug. After performing the assay it was observed that the purity of the drug get slightly minimized after purification, in comparison to the raw one (Table-2), the decrease in purity was due to the presence of foreign matters in the form of herbs like Eclipta alba, lemon juice which may get added due to the process of purification.

**Table-1:** Four samples of kashish with their distinct Organoleptic characteristics. RK- Raw kashish, SBP- Purified with Eclipta alba, SLP- Purified with lemon juice, SKP- Purified with Kanji.

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>RK</th>
<th>SBP</th>
<th>SLP</th>
<th>SKP</th>
</tr>
</thead>
<tbody>
<tr>
<td>COLOUR</td>
<td>Greenish white</td>
<td>Mottled Green</td>
<td>Yellowish green</td>
<td>Yellow ochre</td>
</tr>
<tr>
<td>ODOUR</td>
<td>Nil</td>
<td>Nil</td>
<td>Lemony</td>
<td>Nil</td>
</tr>
<tr>
<td>TASTE</td>
<td>Astringent, metallic</td>
<td>characteristic</td>
<td>Sour, metallic</td>
<td>characteristic</td>
</tr>
</tbody>
</table>

**Table-2:** Assay study of the four samples of purified kashish along with the raw one.

<table>
<thead>
<tr>
<th>RK</th>
<th>SBP</th>
<th>SLP</th>
<th>SKP</th>
</tr>
</thead>
<tbody>
<tr>
<td>99.86</td>
<td>99.81</td>
<td>98.66</td>
<td>99.86</td>
</tr>
</tbody>
</table>

**Table-3:** Estimation and amount of copper in the raw as well as purified kashish.

<table>
<thead>
<tr>
<th>RK</th>
<th>SBP</th>
<th>SLP</th>
<th>SKP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
</tbody>
</table>

**Table-4:** Presence of Insoluble sulphates in the raw as well as purified kashish.

<table>
<thead>
<tr>
<th>RK</th>
<th>SBP</th>
<th>SLP</th>
<th>SKP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
</tbody>
</table>

**Table-5:** PH Value of the raw as well as purified sample of kashish.

<table>
<thead>
<tr>
<th>RK</th>
<th>SBP</th>
<th>SLP</th>
<th>SKP</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1</td>
<td>3.3</td>
<td>2.9</td>
<td>3.0</td>
</tr>
</tbody>
</table>

**Presence of copper**

Presence of copper in Kashish, is an important criteria for physic-chemical evaluation of Kashish, copper may be present in kashish as an impurity itself or can be present in the sample by the external purifying agents. By performing the above mentioned procedure it was found that all the samples are devoid of copper. (Table-3)

**Insoluble bisulphates:** Turbidity does not appear when the samples of raw or purified kashish mixed with hot water, this determined that samples are devoid of bisulphate. (Table-4)

**Ph Study:** Ph study was carried out and it was found that there is no significant change in Ph in between all the samples (Table-5)

**Table-5:** PH Value of the raw as well as purified sample of kashish.

<table>
<thead>
<tr>
<th>RK</th>
<th>SBP</th>
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<th>SKP</th>
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<tbody>
<tr>
<td>3.1</td>
<td>3.3</td>
<td>2.9</td>
<td>3.0</td>
</tr>
</tbody>
</table>

**Infra-red spectroscopical study:** IR Spectroscopic study reveals that there is no deviation in purified samples in respect to raw sample, which signifies that there is negligible amount of herbal materials that actually get adhered to the kashish (fig-2)
Figure 2: Infra-red spectroscopical curve of the purified as well as raw kashish sample. RK- Raw kashish, SBP- Purified with Elipta alba, SLP- Purified with lemon juice, SKP- Purified with Kanji.

Conclusion
Apart from haematinc property, kashish is also used as hair growth modulator, we also know that bhringaraj is very good hair growth stimulator and also lemon juice have anti-dandruff property, thus when we use bhringaraj or lemon for sodhana process, there must be some synergistic effect in between kashish and bhringaraj or lemon juice, but from the given study we can say that, kashish obtained from all three different sodhana process, does not differ significantly, there are certain organoleptic changes, there is no significant changes in percentage purity (Assay) for all the four samples, kashish obtained from lemon juice purification is slightly acidic in nature. All the samples are devoid of copper or insoluble sulphates. IR-Spectroscopic curve from all the four samples are also identical in nature, thus the performed study reveal that there is no significant differentiation between different sodhana process of kashish, further research and investigation in this field is welcomed

Acknowledgement
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References
3. Dr. Ashok D Satpute, Ras Ratna Samucharya, Chaukhamba Sanskrit pathisthan, pp-63.
5. Dr. Damodar Joshi, Rasa shastra, Chaukhamba Orientalia, pp-22.

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