Physicochemical Standardization of *Kushta Abrak Safaid*: A Herbo-Mineral Unani Formulation

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ABSTRACT
*Abrak* (Mica) is a rock forming silicate of aluminium and is used in Unani system in the form of *kushta* (calcined product). After proper purification and incineration *abrak* becomes highly potent and is used in treatment of various diseases of respiratory system, stomach and intestine, tuberculosis, asthma, spermmatorrhea etc. *Hakim* describes *abrak* as antipyretic, general tonic, aphrodisiac, constipative and desiccant. Product standardization of a compound formulation is utmost necessary to check the purity and genuineness of a preparation. In this study the purification, preparation and standardization of *kushta abrak safaid* was performed. *Kushta* was evaluated on classical parameters like finger test, fineness test etc. as well as on modern parameters like bulk density, tapped density, hausner’s ratio, carr’s index, pH, loss of weight on drying, total ash, acid insoluble ash, water soluble ash, extractive value and loss of weight on ignition. The physicochemical parameters evaluated in this study might be considered as standard parameters of *kushta abrak safaid*.

Keywords: *Abrak*, Herbo-mineral, *Kushta*, Standardization, Unani.

INTRODUCTION
*Kushta* is derived from Persian word *kushtan* which means ‘to kill’. *Kushtan or bhasma* is the finest powder form of the medicinal preparations obtained by calcination of metal, minerals and animal drugs. It is easily absorbed in human body and is highly efficacious in action. [¹] The rate of absorption of a drug depends on particle size. Smaller the particle size quicker and greater is the rate of absorption. [²] *Kushta* has the smallest particle size (in nano particle range) hence largest surface area as compared to any other solid dosage form of Unani system of medicine therefore this factor is responsible for rapid action of *kushta*. Subsequent action upon DNA/RNA molecule and protein is further hypothesized as possible mechanisms for rapid onset of therapeutic action of *kushtas*. [³]

*Abrak* is commonly known as mica. Its *Kushta* is considered to be very effective in treating various ailments like chronic fevers, bilious fever, spermatorrhoea, attenuated semen, phthisis and tuberculosis. It is known by different vernacular names like *alq* in Arabic, *sitarah zameen* in Persian, *abharaka, abrak or bhodal* in Ayurveda. [⁴] Chemically *abrak* is Silicate of Alumina with Biotite Magnesia [⁵] and contains several elements such as Si, Fe, Al, Mg and K as main ingredient. [⁶] It is basically of four types; *Pinaka, dardura, naga* and *vajra*. The *pinaka* variety gets separated into smaller segments (lamellae) on subjecting to heat. The *naag* variety produces hissing sound like that of snake. The *dardura* one produces sound like frog (croaking) and the fragments bounces out from heating. The fourth one is ideal as it is immutable on subjecting to heat. [⁵, ⁷]

Mica if used in unpurified raw state results in reduction of life span and appetite and makes the body more prone to bacterial invasion. Hence before using *abrak* it is always subjected to purification. The idea of this is to get rid of the impurities and their deleterious effects. If this purification or ‘tasfiya’ is not performed, its use is said to be injurious to the individual. [⁸] The physicians believed that there is no toxicity due to the unique and repeated purification processes employed during preparation. [⁹] Product standardization of a compound formulation is of paramount importance to ensure the genuineness of a preparation. So in this study *Kushta abrak safaid* was prepared by detoxifying *abrak* as per classical Unani literature. Its *kushta* was prepared in muffle furnace and was evaluated for various physicochemical parameters.

MATERIALS AND METHODS
Abrak safaid (Mica) and mooli (Raphanus sativus) were purchased from the local market of Bangalore. Gilo (Tinospora cardifolia) was taken from the herbal garden of National Institute of Unani Medicine. Shora qalmi (Potassium nitrate) was purchased from chemical shop and was of AR grade.

**Purification of Abrak (Abrak mehloob or Abrak dhanab)**
The layers of raw abrak (Fig. 1) were first separated by pounding it in a mortar. The small pieces of abrak were then kept in a bag of thick cloth along with date seeds (Phoenix dactylifera) and tied (Fig. 2). The bag was then dipped in hot water and rubbed vigorously with both hands. Small particles of abrak were then squeezed out of the bag. The process of dipping the bag in hot water and rubbing was repeated till all the particles of abrak were squeezed out of the bag. The particles of abrak were allowed to settle down at the bottom of the vessels and the water was decanted. Abrak particles were removed and dried. These particles are abrak mehloob or abrak dhanab (Fig. 3). [10-13]

**Method of preparation of kushta abrak safaid**
The kushta was prepared as per Kitab al Taklees but with a slight modification i.e. instead of using the cow dung cakes kushta was prepared in Muffle Furnace because of ease of preparation and better temperature control. 60 g abrak mehloob was triturated in 60 ml of aab mooli (Fig. 4), and then 120 ml decoction of aab gilo was added and triturated (Fig. 5) and dried. Later 60 g of shora qalmi (Potassium nitrate) was added to the mixture and left for drying in sunlight for 1 day. The heating was done as given by Parmar et al. [14] The peak temperature maintained was 1008°C at 35 ± 5 minutes, above 800°C temperature was maintained for 20 ± 5 minutes and above 600°C temperature was maintained for 40 ± 5 minutes. After removal from furnace (Fig. 6) it was dipped in 1 litre water (Fig. 7) so as to remove the quantity of shora qalmi. Subsequently kushta was dried on electric heater (Fig. 8). After drying the finished product i.e. kushta abrak safaid (Fig. 9) was stored in an air tight bottle.
Physicochemical parameters

The prepared kushta abrak safaid was evaluated for organoleptic properties, preliminary tests, bulk density, tapped density, hausner’s ratio, carr’s compressibility index, pH, loss of weight on drying at 105°C, total ash, acid insoluble ash, water soluble ash, water insoluble ash, water soluble extractive value and loss of weight on ignition.

**Bulk density and tapped density** [15-18]

10g of weighed kushta was carefully added to the cylinder with the aid of a funnel. The initial volume was noted and the sample was then tapped until no further reduction in volume was observed. The bulk and tapped densities were calculated by the formula.

- **Bulk Density** = \( \frac{\text{Mass}}{\text{Bulk Volumes}} \)
- **Tapped Density** = \( \frac{\text{Mass}}{\text{Tapped Volumes}} \)

**Hausner’s ratio** [15-16, 19-20]

Hausner’s ratio was calculated by following equation

\[
\text{Hausner’s ratio} = \frac{V_o}{V_f}
\]

Where \( V_o \) = Unsettled apparent volume, \( V_f \) = final tapped volume.

**Carr’s index** [15, 17-19]

Carr’s index was calculated by following equation

\[
\text{Carr’s index} (\%) = \left( \frac{V_f - V_o}{V_f} \right) \times 100
\]

**Loss of weight on drying at 105°C** [15, 18, 21-24]

200 mg of kushta was spread uniformly in petridish and was heated at 105°C then cooled in a desiccator and weighed. The process was repeated till two consecutive weights were constant. The percent loss in weight was calculated.

**Determination of pH in 1% solution and 10% solution** [22, 24]

The pH value of 1% solution

An accurately weighed 1 g of kushta was dissolved in accurately measured 100 ml of distilled water and filtered with whatman’s filter paper. pH was measured with digital pH meter.

The pH value of 10% solution

An accurately weighed 10 g of kushta was dissolved in accurately measured 100 ml of distilled water and filtered with whatman’s filter paper. pH measured with a digital pH meter.

**Total Ash** [23, 25-26]

2 gm of kushta was incinerated in a silica crucible at a temperature not exceeding 450°C. The crucible was then cooled and weighed and the percentage of total ash was calculated.

**Acid insoluble Ash** [23, 25-26]

The ash was boiled with 25 ml of dilute hydrochloric acid for 5 minutes. The insoluble matter was collected on an ash less filter paper washed with hot water and ignited at a temperature not exceeding 450°C and weighed after cooling. The percentage of acid insoluble ash was calculated.

**Water insoluble and Water soluble Ash** [23, 25-26]

The ash was boiled with 25 ml of distilled water for 5 minutes. The insoluble matter was collected on an ash less filter paper, washed with hot water and ignited. The weight of insoluble ash was subtracted from the weight of the total ash, giving the weight of the water soluble ash.

**Determination of Extractive value** [26]

4.0 g of kushta was accurately weighed in a glass stoppered conical flask. 100 ml of water was added and weighed to obtain the total weight including the flask. It was shaken well and was allowed to stand for 1 hour. A reflux condenser was attached to the flask and boiled for 1 hour. 25 ml of the filtrate was transferred to a tared flat-bottomed dish and evaporated to dryness on water-bath then dried at 105°C for 6 hours. Then it was cooled in a desiccator for 30 minutes and weighed.

**Determination of Loss on Ignition (LOI)** [27]

1.0 g kushta was taken in silica crucible and heated to constant weight at 950-1000°C for an hour and then allowed to cool. Loss of weight on ignition was calculated by following equation.

\[
\text{LOI} \% = \left( \frac{(W_2 - W_1) \times 100}{W_2} \right)
\]

Heat pattern followed during the preparation (X axis- Time in minutes, Y axis- Temperature in degree Celsius)
Where $W_1 =$ weight of empty crucible, $W_2 =$ weight of crucible + sample, $W_3 =$ weight of crucible + sample after ignition

Table 1: Organoleptic Description of Kushta Abrak Safaid

| Appearance | Lustreless |
| Colour | Yellowish white |
| Smell | Odourless |
| Taste | Tasteless |

Table 2: Preliminary tests of Kushta Abrak Safaid

<table>
<thead>
<tr>
<th>Preliminary tests</th>
<th>Kushta Abrak Safaid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finess test</td>
<td>Very fine</td>
</tr>
<tr>
<td>Loss of metallic luster</td>
<td>Yes</td>
</tr>
<tr>
<td>Wall stick test</td>
<td>Positive</td>
</tr>
</tbody>
</table>

Table 3: Physicochemical Tests of Kushta Abrak Safaid

<table>
<thead>
<tr>
<th>S. No</th>
<th>Parameters</th>
<th>Mean ± SEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bulk Density (gm/ml)</td>
<td>0.486 ± 0.00</td>
</tr>
<tr>
<td>2</td>
<td>Tapped Density (gm/ml)</td>
<td>0.80 ± 0.01</td>
</tr>
<tr>
<td>3</td>
<td>Hausner’s Ratio (HR)</td>
<td>1.68 ± 0.01</td>
</tr>
<tr>
<td>4</td>
<td>Carr’s Index (%)</td>
<td>39.90 ± 0.02</td>
</tr>
<tr>
<td>5</td>
<td>pH (1%)</td>
<td>9.91 ± 0.02</td>
</tr>
<tr>
<td>6</td>
<td>pH (10%)</td>
<td>10.56 ± 0.02</td>
</tr>
<tr>
<td>6</td>
<td>Loss on drying (%)</td>
<td>0.005 ± 0.00</td>
</tr>
<tr>
<td>7</td>
<td>Loss on Ignition (%)</td>
<td>0.097 ± 0.00</td>
</tr>
<tr>
<td>8</td>
<td>Total ash (%)</td>
<td>96.84 ± 0.03</td>
</tr>
<tr>
<td>9</td>
<td>Acid insoluble ash (%)</td>
<td>86.38 ± 0.08</td>
</tr>
<tr>
<td>10</td>
<td>Water insoluble ash (%)</td>
<td>87.63 ± 0.19</td>
</tr>
<tr>
<td>11</td>
<td>Water soluble ash (%)</td>
<td>4.03 ± 0.02</td>
</tr>
<tr>
<td>12</td>
<td>Extractive value (%)</td>
<td>4.83 ± 0.06</td>
</tr>
</tbody>
</table>

RESULTS AND DISCUSSION

The colour of *kushta abrak* was found to be Yellowish white. It was odorless, tasteless, smooth to touch and lusterless (Table 1). Floating test, fineness test and wall stick test were positive (Table 2). The mean value of bulk density and tapped density of *kushta abrak safaid* were 0.486 ± 0.006 gm/ml and 0.80 ± 0.01 gm/ml respectively (Table 3) The mean value of Hausner’s Ratio and Compressibility Index were 1.68 ± 0.01 and 39.90 ± 0.02% respectively (Table 3); pH in 1% and 10% solution 9.91 ± 0.02 and 10.56 ± 0.02% respectively (Table 3). The mean percentage of loss of weight on drying was 0.005 ± 0.00% (Table 3). The mean percentage value of the total ash, acid insoluble ash, water soluble ash and water insoluble ash were 96.84 ± 0.03%, 86.38 ± 0.08%, 4.03 ± 0.02% and 87.63± 0.19% respectively (Table 3). The mean percentage of the water soluble extractive value was 4.83 ± 0.06% (Table 3). The mean percentage of loss of weight on ignition was 0.097 ± 0.00 (Table 3). These findings would definitely help in providing assurance in use of *kushtas* for medication by ensuring batch to batch uniformity. The results obtained for the various physicochemical parameters of *kushta abrak safaid* may be taken as standard parameters for future reference.

REFERENCES