PREPARATION AND PHYSICOCHEMICAL EVALUATION OF
KUSHTA SANG JARAHAT: A UNANI FORMULATION

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ABSTRACT

Kushta is an essential dosage form of Unani system of medicine. Due to small particle size, it is rapidly absorbed in human body and leads to instant therapeutic actions. Quality Control means the control of “goodness” or the “excellence” of a product. In this ever-changing pattern of producing and making things, if “quality” of a product is not maintained then it is difficult for the product to survive. Since at present no work has been carried out regarding the physicochemical evaluation of Kushta sang jarahat hence present study was carried out to evaluate Kushta sang jarahat physicochemically by evaluating it on classical tests along with modern scientific analytic techniques. The mean value of bulk density and tapped density of kushta sang jarahat were 0.55± 0.00 gm/ml and 0.84±0.00 gm/ml. The mean value of Hausner’s Ratio and Compressibility Index were 1.50±0.00 and 33.59±0.47%. pH in 1% and 10% solution were 4.53±0.01 and 5.09±0.00. The mean percentage of loss of weight on drying was 0.003±0.00%. The total ash, acid insoluble ash, water soluble ash and water insoluble ash were 96.26± 0.03%, 77.57± 0.03%, 11.67± 0.04% and 84.44± 0.08%. The mean percentage of the water soluble extractive value was 1.83± 0.03%. The results obtained are considered as standard quality control parameters for kushta sang jarahat.

KEYWORDS: Kushta, Sang jarahat, Physico-chemical evaluation, Unani.
INTRODUCTION
The calcined forms of metals that are termed as *kushtas* in Unani tibb are referred as *bhasmas* in Ayurveda and *parpams* in Siddha.\(^1,^2\) *Sang jarahat* (Magnesium silicate) is one of the most popular mineral renowned for its wide spread applicability since antiquity. It is known by different names like soap stone, *sang jarahat* etc. It occurs in grey flat irregular pieces or thick masses, smooth and unctous to touch, appearing like a soap. It is powerful astringent, dessicant and styptic. It is used internally in diarrhoea, dysentry, menorrhagia and leucorrhoea.\(^3\) Locally it is applied to syphilitic sores and ulcers, also checks bleeding from nose and wounds.\(^3\) It is administered internally in the form of *kushta*. Its *kushta* is found highly effective in spermatorrhoea, haemorrhage, epistaxis, haematuria, asthma, fever and sexual debility. Even though this Unani compound formulation has a very good reputation in treating several diseases effectively but still no systematic work has been carried regarding its physicochemical evaluation. Therefore, present study was conducted to physicochemically evaluate *Kushta sang jarahat* on classical and modern parameters to establish its quality control parameters.

MATERIALS AND METHODS
*Sang jarahat* and *Aloe barbadensis* were purchased from local market.

Method of Detoxification
*Sang jarahat* was detoxified as per classical Unani literature. It was dipped in *rogan kunjad* for three days and washed with hot water (Fig. 1).\(^4\)

Method of preparation of *Kushta sang jarahat*
*Kushta* was prepared as per method mentioned in *Kitab ul taklees*\(^5\) with a minor amendment, that instead of using the cow dung cakes as heat source, it was prepared in furnace because of ease of preparation, simplicity of operation and better temperature control. Twelve gram of *sang jarahat musaffa* (Fig. 2) was dipped in *aab ghekwar* (Fig. 3) then subjected to heat inside Muffle furnace. After cooling (Fig. 4) the *kushta* was removed carefully and stored in an airtight bottle (Fig. 5). The heat applied for the preparation of *kushta* was according to following program. The peak temperature of 1078°C was maintained for 70 minutes, above 800°C temperature was maintained for 55 ± 5 minutes and above 600°C temperature was maintained for 80 ± 5 minutes (Fig. 6). Three batches were made to obtain Mean ± SEM values.
Fig. 1 Sang jarahat musaffa  
Fig. 2 Triturated Sang jarahat musaffa

Fig. 3 Sang jarahat dipped in aab ghekwar  
Fig. 4 Kushta removed from furnace

Fig. 5 Kushta sang jarahat

Fig. 6 Thermogram followed during preparation of Kushta sang Jarahat
Physico-chemical parameters

(i) **Floating test:** If a small quantity of *kushta* is sprinkled on water surface then it should float on the surface.\(^6\)

(ii) **Grain floating test:** Grain of rice, barley, etc. will float over the ideal *kushta* like a swan on a lake.\(^7\)

(iii) **Fineness test:** On rubbing a small quantity of the *kushta* between the fingers, it should enter into the lines and creases of the fingers.\(^6\)

(iv) **Loss of metallic luster:** When visually examined preferably in presence of sun light, no metallic luster should be observed.\(^7,8\)

(v) **Wall stick test:** On throwing on the wall, ideal *kushta* should stick to the wall.\(^6\)

**Bulk density and tapped density**

Five gram *kushta sang jarahat* was introduced into a 25 ml measuring cylinder. After that initial volume was observed. The cylinder was then allowed to fall under its own weight onto a hard surface from the height of 2.5 cm at two sec intervals. The tapping was continued until no further change in volume was noted. The bulk density and tapped density were calculated using the following formulas.\(^9\)

Bulk density = \( W / V_o \)

Tapped density = \( W / V_f \)

Where, \( W \) = weight of *kushta*, \( V_o \) = initial volume, \( V_f \) = final volume.

**Hausner’s ratio**

Hausner’s ratio was calculated by the following equation.\(^10\)

Hausner’s ratio = \( V_o/V_f \)

Where \( V_o \) = Untapped apparent volume, \( V_f \) = Tapped apparent volume.

**Carr’s index**

Carr’s compressibility index was calculated by\(^11\)

\[ \times 100 \]
Loss of weight on drying at 105°C

*Kushta sang jarahat* 200 mg was spread homogeneously 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 percentage of loss in weight was calculated.[12]

**Determination of pH in 1% and 10% solution**

**pH value of 1% solution**

*Kushta sang jarahat* one gram was dissolved in 100 ml distilled water and filtered with whatman’s filter paper. pH was measured with a digital pH meter.[12]

**pH value of 10% solution**

*Kushta sang jarahat* ten grams was dissolved in 100 ml distilled water and filtered with whatman’s filter paper. pH was measured with a digital pH meter.[12]

**Determination of Total Ash**

*Kushta sang jarahat* two gram was incinerated in silica dish at a temperature not exceeding 450°C. The percentage of ash was calculated.[13]

**Determination of Acid-Insoluble Ash**

To the crucible containing total ash 25 ml dilute Hydrochloric acid was added. The insoluble matter was collected on Whatman ashless filter paper and washed with hot water until the filtrate was neutral. The filter paper containing the insoluble matter was transferred to the original crucible, dried on a hot-plate and ignited to constant weight. The residue was allowed to cool in a desiccator for 30 minutes and weighed without delay. The content of acid-insoluble ash was calculated.[13]

**Determination of Water Soluble Ash**

The total ash was boiled for five minutes with 25 ml of water and insoluble matter was collected in a crucible or on an ashless filter paper and washed with hot water, and ignited for 15 minutes at a temperature not exceeding 450°C. The weight of the insoluble matter was subtracted from the weight of the total ash; the difference in weight represented the water-soluble ash.[13]

**Determination of Extractive value**

*Kushta sang jarahat* four grams was put in a conical flask and then 100 ml water was added and weighed to obtain the total weight including the flask. It was shaked well and was
allowed to stand for one hour. A reflux condenser was attached to the flask and boiled for one hour. Afterwards 25 ml of the filtrate was transferred to a tarred petridish and evaporated to dryness on water-bath then dried at 105°C for six hours. Then it was cooled in a desiccator for 30 minutes and weighed.\textsuperscript{[14]}

**RESULTS AND DISCUSSION**

The colour of *kushta sang jarahat* was white (Fig. 5). It was odorless, tasteless, lusterless smooth to touch, and very fine (Table 2). Floating test (Fig. 7), grain floating test (Fig. 8), finger test (Fig. 9) and wall stick test were positive. (Table 3)

![Fig. 7 Floating test](image1)
![Fig. 8 Grain floating test](image2)
![Fig. 9 Finger test](image3)

**Table 1: Physical properties of raw Sang jarahat**

<table>
<thead>
<tr>
<th>Properties</th>
<th>Raw Sang jarahat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardness</td>
<td>Soft</td>
</tr>
<tr>
<td>Colour</td>
<td>Grayish white</td>
</tr>
<tr>
<td>Touch</td>
<td>Soapy</td>
</tr>
<tr>
<td>Solubility in water</td>
<td>Insoluble</td>
</tr>
<tr>
<td>Transparency</td>
<td>Translucent</td>
</tr>
</tbody>
</table>

**Table 2: Organoleptic properties of raw sang jarahat and Kushta sang jarahat**

<table>
<thead>
<tr>
<th>Properties</th>
<th>Raw Sang jarahat</th>
<th>Kushta Sang jarahat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour</td>
<td>Grayish white</td>
<td>White</td>
</tr>
<tr>
<td>Odour</td>
<td>Odourless</td>
<td>Odourless</td>
</tr>
<tr>
<td>Taste</td>
<td>Tasteless</td>
<td>Tasteless</td>
</tr>
<tr>
<td>Touch</td>
<td>Soapy</td>
<td>Smooth</td>
</tr>
<tr>
<td>Appearance</td>
<td>Shining</td>
<td>Lusterless</td>
</tr>
</tbody>
</table>
Table 3: Preliminary tests of Kushta sang jarahat

<table>
<thead>
<tr>
<th>Tests</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floating test</td>
<td>Positive</td>
</tr>
<tr>
<td>Grain floating test</td>
<td>Positive</td>
</tr>
<tr>
<td>Fineness test</td>
<td>Very fine</td>
</tr>
<tr>
<td>Wall stick test</td>
<td>Positive</td>
</tr>
<tr>
<td>Finger test</td>
<td>Positive</td>
</tr>
</tbody>
</table>

Table 4: Physicochemical Tests of Kushta sang jarahat

<table>
<thead>
<tr>
<th>Parameters</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>Mean± SEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulk density(gm/ml)</td>
<td>0.55</td>
<td>0.57</td>
<td>0.55</td>
<td>0.55± 0.00</td>
</tr>
<tr>
<td>Tapped Density(gm/ml)</td>
<td>0.83</td>
<td>0.85</td>
<td>0.84</td>
<td>0.84±0.00</td>
</tr>
<tr>
<td>Hausner’s ratio(HR)</td>
<td>1.50</td>
<td>1.49</td>
<td>1.52</td>
<td>1.50±0.00</td>
</tr>
<tr>
<td>Carr’s index (%)</td>
<td>33.33</td>
<td>32.94</td>
<td>34.52</td>
<td>33.59±0.47</td>
</tr>
<tr>
<td>pH (1%)</td>
<td>4.52</td>
<td>4.52</td>
<td>4.55</td>
<td>4.53±0.01</td>
</tr>
<tr>
<td>pH (10%)</td>
<td>5.08</td>
<td>5.10</td>
<td>5.10</td>
<td>5.09±0.00</td>
</tr>
<tr>
<td>Loss of weight on drying (%)</td>
<td>0.003</td>
<td>0.003</td>
<td>.003</td>
<td>0.003±0.00</td>
</tr>
<tr>
<td>Total ash (%)</td>
<td>96.35</td>
<td>96.27</td>
<td>96.24</td>
<td>96.26± 0.03</td>
</tr>
<tr>
<td>Acid insoluble ash (%)</td>
<td>77.50</td>
<td>77.63</td>
<td>77.59</td>
<td>77.57± 0.03</td>
</tr>
<tr>
<td>Water insoluble ash (%)</td>
<td>84.60</td>
<td>84.29</td>
<td>84.43</td>
<td>84.44± 0.08</td>
</tr>
<tr>
<td>Water soluble ash (%)</td>
<td>11.75</td>
<td>11.68</td>
<td>11.60</td>
<td>11.67± 0.04</td>
</tr>
<tr>
<td>Water soluble extractive (%)</td>
<td>1.8</td>
<td>1.8</td>
<td>1.9</td>
<td>1.83± 0.03</td>
</tr>
</tbody>
</table>

The mean value of bulk density and tapped density of kushta sang jarahat were 0.55± 0.00 gm/ml and 0.84±0.00 gm/ml respectively (Table 4). Bulk density is measured as the mass per unit volume. It is an important factor for process development of solid dosage forms. The tapped density indicates random dense packing of the substance. The mean value of Hausner’s Ratio and Compressibility Index were 1.50±0.00 and 33.59±0.47% respectively (Table 4). It is an indicator of tendency of powder to consolidate. For poorly flowing substance, there are larger inter particle interactions, which consequences in lower bulk density and a larger difference between bulk and tapped densities. These differences are reflected as compressibility index. So, larger variation between bulk and tapped densities of kushta sang jarahat indicated poor flowability which is further confirmed by the fact that compressibility index of kushta sang jarahat was greater than 33. pH in 1% and 10% solution were 4.53±0.01 and 5.09±0.00 respectively (Table 4). The mean percentage of loss of weight on drying was 0.003±0.00%. (Table 4) As the prepared kushta showed very smaller amount of weight loss on drying, it was be implicit that the end product was lacking in organic matters. The mean percentage value of the total ash, acid insoluble ash, water soluble ash and water insoluble ash were 96.26± 0.03%, 77.57± 0.03%, 11.67± 0.04% and 84.44± 0.08% respectively (Table 4). Higher ash values suggested the presence of high inorganic substance in the kushta. Lower value of the acid insoluble ash indicated greater physiological
availability of the drug. The mean percentage of the water soluble extractive value was 1.83± 0.03%. (Table 4) Extractive values assist in the determination of the adulteration and is a key of the purity of the product. Lower extractive values again verify that *kushta* was prepared appropriately.

**CONCLUSION**

This study gave precious information regarding method of preparation and quality control parameters of *kushta sang jarahat* to establish its standards, but further studies like clinical trials, animal studies etc. are needed to be done on *kushta sang jarahat* to convince the modern society regarding safety and higher efficacy of this Unani compound formulation.

**REFERENCES**


