Quality control parameters of Gandhakadi Yoga tablets W. S. R. To its microscopic evaluation

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ABSTRACT
Gandhakadi Yoga is a formulation suggested for Loha Sevanajanya Vikara Prashamana (Iron overload) in Ayurveda Prakasha and can be used as iron chelator which might help to decrease the iron overload. The present study was carried out to standardize the finished product Gandhakadi Yoga tablets for confirmation of its identity, quality and purity. Thus a trial was made to establish the Quality assessing parameters for Gandhakadi Yoga tablets by simple microscopic technique. The characters i.e. black debris of Gandhaka treated with Bhringaraja, light yellow brown content of Gandhaka, fragment of spongy parenchyma of Agastya leaf, oil globules and epicarp cells with tannin content of Vidanga etc. were the characteristic features of the finished product.

Introduction
Gandhakadi Yoga is a modified form of the drug suggested for symptoms produced after intake of improperly prepared Loha Bhasma (Apakva Loha Sevanajanya Vikara Prashamana or Iron overload) in Ayurveda Prakasha. [1] This drug Gandhakadi Yoga tablet has been evaluated for Iron Sorbitol induced iron overload in albino rats by Pramod Yadav et al (2011) [2] with promising results, and hence it can be used as iron chelator and might help in decreasing iron overload in human beings too.

The Pre-clinical studies of Gandhakadi Yoga have already been carried out in which standardization, pharmaceutical, pharmacological studies and also clinical observations on healthy volunteers were done. [3, 4] The toxicological study conducted has shown the safety aspect of the drug. Till date no work has been reported regarding microscopic study of Gandhakadi Yoga tablets, so the present work was carried out to standardize the finished product Gandhakadi Yoga tablets to confirm its identity, quality and purity and also to produce the Quality Control parameters for future researchers.

Aims and objectives
To establish microscopic parameters of Gandhakadi Yoga tablets.

Materials and methods
Collection, Identification and Authentication of raw drugs
Fresh Bhringaraja (Eclipta alba L.) Panchanga and Agastya (Sesbenia grandiflora Linn.) leaves were collected from the periphery of Jamnagar in month of August-September. Raw Gandhaka (Natural Sulphur) and Fruits of Vidanga (Embelia robusta Burm.f.) were obtained from the Pharmacy of Gujarat Ayurved University, Jamnagar. All the drugs were authenticated for good quality by the in house Pharmacognosy Laboratory. The Ayurvedic Pharmacopoeia of India (A.P.I.) standards were used for authentication. [5] Gandhakadi Yoga
tablet were prepared by following Standard Operating Procedures (S.O.P.).

Method of Preparation of Gandhakadi Yoga tablets
The authenticated raw drugs were taken for the preparation (Table 1). First of all known quantity of raw Gandhaka (Sulphur) was melted by adding specified quantity of Goghrita, after complete melting, liquefied Gandhaka (Sulphur) in Goghrita was poured in to Bhringaraja Swarasa through a clean cotton cloth. The process was repeated for 7 times as per the textual references. [6] The Gandhaka (Sulphur) obtained at the base of the vessel was collected, washed with hot water and dried properly. Then, the powders of Shuddha Gandhaka (Purified Sulphur) and Vidanga (Embelia robusta Burm.f.) were taken in equal quantity and triturated with juice of Agastya (S. grandiflora Linn.) leaves. The Bhavana (Triturition) process was repeated for three times. Granules were prepared by sieve (No. 20) and then tablets prepared by following S.O.P.

Microscopic evaluation
The purpose of the Microscopic study was to confirm the authenticity of the drugs used in the preparation of Gandhakadi Yoga tablets. Before preparation of finished product, natural and purified Gandhaka were subjected to organoleptic evaluation and microscopic observations. 1-2 tablets of Gandhakadi Yoga tablets dissolved in distilled water, filtered and observed in plain water and then stained with Phloroglucinol and concentrated HCl to study the microscopic characters of the finished product. The micro-photographs were taken by Carl-zeiss Trinocular microscope attached with camera. [7]

Results

Organoleptic characters
Organoleptic characters of Ashuddha Gandhaka (Natural Sulphur), Shuddha Gandhaka (Purified Sulphur) and Gandhakadi Yoga tablets like color, touch, odor and taste are described in the Table 2.

Microscopic characters
Microscopic characters of Ashuddha Gandhaka, Shuddha Gandhaka and Gandhakadi Yoga tablets are described below:

- **Ashuddha Gandhaka**: Greenish yellow debris with some crystalline material. [Fig 1,2]
- **Shuddha Gandhaka**: Dark yellow contents, oil globules of ghrita and adherant epidermal cells of Bhringaraja found. [Fig 3-5]

- **Gandhakadi Yoga tablets**: Diagnostic characters of tablets under the microscope i.e. black debris of Gandhaka (Sulphur) treated with Bhringaraja (E. alba L.), light yellow brown content of Gandhaka (Sulphur), spool shaped epidermal cells of Bhringaraja (E. alba L.), stone cells, pitted sclerides, oil globules, simple starch grains with hilum, epicarp cells with tannin content of Vidanga (Embelia robusta Burm.f.), prismat crystals, simple trichomes, fragment of spongy parenchyma of Agastya (S. grandiflora Linn.) leaf are observed. [Fig 6-15]

Discussion

Gandhakadi Yoga tablets consist of two herbal and one mineral ingredient. Gandhaka contains both physical and chemical impurities. Ashuddha Gandhaka is likely to produce diseases i.e. Kushtha, Tapu, Bhrama, Pittika disorders, Bala, Varna, Sukha and Viryahan. [8] Hence, it should be subjected to Shodhana process before consumption. In the present study Gandhaka Shodhana was carried out in Bhringaraja Swarasa because its action on Raktavaha Srotasa was expected.

Adulterants of Vidanga
Fruits of Embelia tsjerium-cottom (Roem. and Schult) A. Dc. (Syn. E. robusta auct. Non Roxb.) are used as adulterant to Embelia ribes. The fruits of Myrsine africana Linn. are reported as good substitute for Embelia ribes. [9] Authentication of the commonly used drugs through morphological parameters can prevent the accidental misuse or adulteration to a greater extent.

In the present study, all the ingredients of Gandhakadi Yoga tablets were proved to be genuine by assessing the microscopic parameters, which are cross-verified with reference of A.P.I. Microscopy of Gandhakadi Yoga tablets showed the striking characters of all individual three drugs in the final product. It confirms the ingredients present in the finished product and there is no major change in the microscopic structure of the raw drugs during the pharmaceutical processes of preparation of Gandhakadi Yoga tablets.

Conclusion
The study concludes that, the ingredients used in the preparation of Gandhakadi Yoga Tablets are genuine in nature. This study results can be used as Quality assessing parameters of Gandhakadi Yoga tablets.
Table 1: Showing ingredients of Gandhakadi Yoga tablets

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name of Drug</th>
<th>Botanical/English name</th>
<th>Part used</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Shuddha Gandhaka</td>
<td>Purified Sulphur</td>
<td>Whole part</td>
<td>1 part</td>
</tr>
<tr>
<td>2.</td>
<td>Vidanga</td>
<td>Embelia robusta Burm.f.</td>
<td>Dried Fruits</td>
<td>1 part</td>
</tr>
<tr>
<td>3.</td>
<td>Agastya</td>
<td>Sesbenia grandiflora Linn.</td>
<td>Fresh Leaves</td>
<td>Q.S. for Bhavana</td>
</tr>
</tbody>
</table>

Table 2: Showing Organoleptic characters of Ashuddha Gandhaka, Shuddha Gandhaka and Gandhakadi Yoga tablets

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Characters</th>
<th>Ashuddha Gandhaka</th>
<th>Shuddha Gandhaka</th>
<th>Gandhakadi Yoga tablets</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Colour</td>
<td>Light greenish yellow</td>
<td>Dark yellow</td>
<td>Grayish to ash</td>
</tr>
<tr>
<td>2.</td>
<td>Touch</td>
<td>Coarse</td>
<td>Fine</td>
<td>Smooth</td>
</tr>
<tr>
<td>3.</td>
<td>Odour</td>
<td>Offensive</td>
<td>Ghee mixed with Gandhaka</td>
<td>Sulphur smell</td>
</tr>
<tr>
<td>4.</td>
<td>Taste</td>
<td>Astringent</td>
<td>Oily</td>
<td>Sour, Astringent</td>
</tr>
</tbody>
</table>

PHOTOGRAPHS OF POWDER MICROSCOPY

*Ashuddha Gandhaka (Natural Sulphur)*

Fig 1: Greenish yellow debris  
Fig 2: Crystalline material

*Shuddha Gandhaka (Purified Sulphur)*

Fig 3: Dark yellow contents of purified Sulphur  
Fig 4: Oil globule of ghrita
Fig 5: Adherent epidermal cells of *Bhringaraja* *Gandhakadi Yoga* tablets

Fig 6: Black debris of *Gandhaka*

Fig 7: Light yellow brown content treated with *Bhringaraja* of *Gandhaka*

Fig 8: Spool shaped epidermal cells of *Bhringaraja*
Fig 9: Stone cell with wide lumen of Vidanga

Fig 10: Pitted sclerides of Vidanga

Fig 11: Oil globule of Vidanga

Fig 12: Epicarp cell with tannin content of Vidanga

Fig 13: Prismatic crystals of Agastya
Conflict of interest statement

We declare that we have no conflict of interest.

References

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9. Database on medicinal plants used in Ayurveda & Siddha, Vol.5, New Delhi, CCRAS, Department. of AYUSH, Ministry of Health and Family welfare, Govt. of India, 2008, Pg.482.


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