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**PHARMACOGNOSTICAL AND PHYSICO-CHEMICAL EVALUATION OF *MUKKADI* *YOGA* – AN *AYURVEDIC* OCULAR FORMULATION**

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**ABSTRACT**

*Mukkadi* *yoga* is a poly-herbal formulation indicated for *Bidalaka* (ocular anointment) in inflammatory eye diseases. **Aim:** The present study deals with the pharmacognostical identification of ingredients of *Mukkadi* *yoga* and its physico-chemical analysis. **Objective:** Pharmacognostical study comprising of both macroscopic and powder microscopy of raw drug revealed the quality and genuineness of all the constituents of *Mukkadi* *yoga*. Organoleptic features of coarse powder made out of the crude drugs were within the standards prescribed.

**Keywords:** *Bidalaka*, *Mukkadi* *yoga*, Organoleptic features, Pharmacognostical, Physicochemical

**INTRODUCTION**

*Ayurveda* is enriched with a plenty of simple and useful drug formulations. These are scattered in different *samhitas*. A timely modification also has been included by the succeeders; but it was fully based on drug availability at those periods. Likewise traditional knowledge of the local *vaidyas* has been sculpted in different local languages which make most of them inaccessible to the physician community. Thus Standardization has become the need of the hour for *Ayurvedic* drugs and procedures.

Eye diseases need a systemic approach for cure from the root. But the uniqueness of ophthalmic therapeutic procedures lies in the imperative usage of local therapies; the so called *Kriyakalpas.* Among this *Bidalaka* refers to application of medicated paste (in suitable medium) over the eye lid excluding eyelashes1. It is indicated in *Amaja* *avastha* (inflammatory ocular conditions characterized by pain, redness, swellings, discharges etc.) of eye diseases.2  *Mukkadi yoga* is one such formulation explained in *Sahasrayogam*, a very popular medical text in Malayalam language containing 1000 formulations for different diseases and the formulations are arranged in its dosage form like *kwathas*, *gutikas*, *churnas* etc3. The text in local language also contains clinical features and treatment of diseases over supraclavicular areas. *Mukkadi yoga* is a *vidalaka yoga* told in *Urdwanga roga chikitsa* under the *Vartmarogachikitsa prakarana* of *Sahasrayogam* text which is said to be useful in inflammatory signs and symptoms of eye i.e. *sopha, ruja, daha, raga* etc.4 It is widely used in *vranasophas* of *netras* like *anjana namika, utsangini* etc. The contents are predominantly cooling, works on vitiated *pitta* and *rakta* and majority have haemostatic activity. Hence it has been selected for trans-dermal absorption as a *pittashamaka* action.

In view of severe undesirable side effects of synthetic agents, there is growing focus to follow systematic research methodology and to provide scientific basis for the traditional herbal medicines that are claimed to possess effect in eye disorders. The first step for scientifically based research is to provide quality standardization of drug. With this background the present study was undertaken to ascertain the authenticity of all the ingredients of *Mukkadi* *yoga* and presence of components as recommended in Ayurvedic Pharmacopoeia of India (API) through pharmacognostical study and physicochemical analysis of the *churna* *yoga*5.

**Material and Methods**

**Collection of Raw Drug:**

Raw drugs for the study were procured from the Pharmacy, I.P.G.T. & R.A., G.A.U., Jamnagar. Only *Durva* was collected from the campus premises. All these were identified and authenticated in Pharmacognosy Laboratory, IPGT and RA, Gujarat Ayurved University, Jamnagar. The test drug *Mukkadi* *Yoga* was prepared as per classical reference of powder formulation (*Churna* *kalpana*) and physicochemical and qualitative analysis of the final product was carried out in pharmaceutical chemistry laboratory of IPGT & RA, Jamnagar.

**Method of preparation of** *Mukkadi* *yoga*:

After collecting all the ingredients of *Mukkadi* *yoga*, it was finely grinded up to it’s become fine powder form.

**Table 1:** Ingredients of *Mukkadi* *Yoga*

|  |  |  |  |
| --- | --- | --- | --- |
| Drug | Botanical name/ chemical name | Part Used | Parts |
| *Hareetaki* | *Terminalia* *chebula* Retz. | Fruit | 1 part |
| *Amalaki* | *Embilica* *officinalis* Gaertn | Fruit | 1 part |
| *Vibheetaki* | *Terminalia* *bellerica* Roxb. | Fruit | 1 part |
| *Gairika* | Red ochre feo |  | 1 part |
| *Chandana* | *Santalum* *album* Linn. | Heart wood | 1 part |
| *Raktha Chandana* | *Pterocarpus* *santalinus* | Heart wood | 1 part |
| *Haridra* | *Curcuma* *longa* Linn. | Rhizome | 1 part |
| *Daruharidra* | *Berberis* *aristata* DC | Rhizome | 1 part |
| *Lodhra* | *Symplococcus* *racemosus* | Stem bark | 1 part |
| *Sariba* | *Hemidesmus* *indicus* R Br | Root | 1 part |
| *Vata* | *Ficus* *bengalensis* | Leaf bud | 1 part |
| *Durva* | *Cynodon* *dactylon* | Whole plant | 1 part |
| *Useera* | *Vetivera* *zizanoidis* Linn. | Root | 1 part |
| *Nimba* | *Azadirachta* *indica* Juss. | Leaves | 1 part |

**Pharmacognostical evaluation**

Dry Powder of the *Prayojyaanga* of drugs which was used in preparation of *Mukkadi Yoga* had been used for this study. The root and powder characters were identified with the help of Pharmacognosy laboratory, Institute for Post Graduate Teaching & Research in Ayurveda, Gujarat Ayurved University, Jamnagar, India.

**Organoleptic study**

Organoleptic characters like texture, taste, odour and colour etc**.** of *Mukkadi Yoga* was evaluated in this study (Table 2)**.**

**Microscopic Study6**

The powder was dissolved in small quantity of distilled water, first observed without stain then stained with phloro-glucinol and concentrated HCL7. Powder microscopy of *Mukkadi Yoga* powder was also carried out and microphotographs were taken by Carl zeiss trinocular microscope.

**Physico-chemical analysis of Drug8**

As per the API guideline, *Mukkadi yoga* was analyzed by using qualitative and quantitative parameters at Pharmaceutical Chemistry Laboratory, Institute for Post Graduate Teaching & Research in Ayurveda, Gujarat Ayurved University, Jamnagar, India.

**Results and Discussion**

**Organoleptic Parameters**

Organoleptic characters of *Mukkadi* *Yoga* powder are described in the Table No. 2.

**Table 2:** Organoleptic Properties of *Mukkadi* *Yoga*

|  |  |
| --- | --- |
| Rupa (colour ) | Reddish Brown |
| Rasa (Taste ) | Bitter, Astringent |
| Gandha (Odour) | Sweet, Sour |
| Sparsha (Consistency in Touch ) | Fine Powder |

**Pharmacognostical evaluation**

Pharmacognostical features of *Mukkadi* *Yoga* powder areshowed in Plate no. 1 (Fig.1-24)

**Plate 1:** Photographs of Microscopic Features Ingredients of *Mukkadi Yoga*

|  |  |  |
| --- | --- | --- |
| C:\Users\deepak\Desktop\cognosy\Cognosy-Deepak\stone cell of haritaki.JPG | C:\Users\deepak\Desktop\cognosy\Cognosy-Deepak\stone cell of daruharidra.JPG | C:\Users\deepak\Desktop\cognosy\Cognosy-Deepak\oil globule of chandana.JPG |
| Stone cell of *Haritaki* | Stone cell of *Daruharidra* | Oil globule of *Chandana* |
| C:\Users\deepak\Desktop\cognosy\Cognosy-Deepak\scleroid of lumen pitted of bibhitaki.JPG | C:\Users\deepak\Desktop\cognosy\Cognosy-Deepak\septate fiber of usheera.JPG | C:\Users\deepak\Desktop\cognosy\Cognosy-Deepak\scleroid of haritaki.JPG |
| Scleroid of lumen pitted of *Bibhitaki* | Septate fibre of *Usheera* | Scleroid of *Haritaki* |
| C:\Users\deepak\Desktop\cognosy\Cognosy-Deepak\scleroid of amalaki.JPG | C:\Users\deepak\Desktop\cognosy\Cognosy-Deepak\rhomoid crystal of sariva.JPG | C:\Users\deepak\Desktop\cognosy\Cognosy-Deepak\rhomboid crystal of lodhra.JPG |
| Scleroid of *Amalak*i | Rhomoid crystal of *Sariva* | Rhomboid crystal of *Lodhra* |
| C:\Users\deepak\Desktop\cognosy\Cognosy-Deepak\pitted stone of vata.JPG | C:\Users\deepak\Desktop\cognosy\Cognosy-Deepak\oil globule of usheera.JPG | C:\Users\deepak\Desktop\cognosy\Cognosy-Deepak\prismatic crystal of daruharidra.JPG |
| Pitted stone of *Vata* | Oil globule of *Usheera* | Prismatic crystal of *Daruharidra* |
| C:\Users\deepak\Desktop\cognosy\Cognosy-Deepak\simple and compound starch cell of sariva.JPG | C:\Users\deepak\Desktop\cognosy\Cognosy-Deepak\lignified hard fiber of raktachandana.JPG | C:\Users\deepak\Desktop\cognosy\Cognosy-Deepak\fragments of border pitted vessel of daruharidra.JPG |
| Simple & compound starch cell of *Sariva* | Lignified hard fibre of *Raktachandana* | Fragments of border pitted vessel of *Daruharidra* |
| C:\Users\deepak\Desktop\cognosy\Cognosy-Deepak\coloring matter with starch grains of raktachandana.JPG | C:\Users\deepak\Desktop\cognosy\Cognosy-Deepak\fiber passing through medullary rays of nimba.JPG | C:\Users\deepak\Desktop\cognosy\Cognosy-Deepak\fragments of scleleriforum vessel of haridra.JPG |
| Coloring matter with starch grains of *Raktachandana* | Fibre passing through medullary rays of *Nimba* | Fragments of scleleriforum vessel of *Haridra* |
| C:\Users\deepak\Desktop\cognosy\Cognosy-Deepak\fiber of durva.JPG | C:\Users\deepak\Desktop\cognosy\Cognosy-Deepak\fiber brown content of sariva.JPG | C:\Users\deepak\Desktop\cognosy\Cognosy-Deepak\crystal fiber of daruharidra.JPG |
| Fibre of *Durva* | Fibre brown content of *Sariva* | Crystal fibre of *Daruharidra* |
| C:\Users\deepak\Desktop\cognosy\Cognosy-Deepak\fibre of amalaki.JPG | C:\Users\deepak\Desktop\cognosy\Cognosy-Deepak\border pitted vessel of chandana.JPG | C:\Users\deepak\Desktop\cognosy\Cognosy-Deepak\cork in surface view of vata.JPG |
| Fibre of *Amalaki* | Border pitted vessel of *Chandana* | Cork in surface view of *Vata* |

**Physico-Chemical Parameters**

*Mukkadi* *yoga* was analyzed using various standard physico-chemical parameters such as Loss on drying, Ash value, Water extract value, Alcohol extract value and pH. The results are shown in table no. 3.

**Table 3:** Physico-Chemical Parameters of *Mukkadi Yoga*

|  |  |  |
| --- | --- | --- |
| **Sr. no.** | **Analytical Parameter** | ***Mukkadi yoga*** |
| 1. | Loss on drying | 0.069% |
| 2. | Ash value | 22.97% |
| 3. | Water Soluble extract value | 0.306 % |
| 4. | Alcohol Soluble extract value | 11% |
| 5. | pH | 4.5 |

Physico-chemical analysis of the compound revealed loss on drying of test drug is 0.069 % w/w, Ash value of powder is 22.97% w/w, Water soluble extract and alcohol soluble extract is 0.306% w/w & 11.00 % w/w respectively and pH of the compound is 4.5 as shown in table no 3.

**High Performance Thin Layer Chromatography (HPTLC)**

On performing HPTLC, track showed 8 spots under 254nm with Rf values 0.09, 0.61, 0.67, 0.74, 0.80, 0.86 0.91, 1.00 and 7 spots were seen under 366nm with Rf values 0.06, 0.17, 0.63, 0.67, 0.75, 0.82, 0.88 as depicted in the table no 4. After completion of chromatographic procedure spraying of the plate was done with vanillin sulfuric acid and the spots obtained were observed in day light plate no.2.

**Table 4:** HPTLC of Mukkadi yoga

|  |  |  |
| --- | --- | --- |
| Wave Length | No. of spots | Rf value |
| UV-254 nm | 8 | 0.09, 0.61, 0.67, 0.74, 0.80, 0.86 0.91, 1.00 |
| UV-366 nm | 7 | 0.06, 0.17, 0.63, 0.67, 0.75, 0.82, 0.88 |

**Plate 02:** Densitogram - *Mukkadi yoga*

|  |  |
| --- | --- |
|  |  |
| G:\haripriya\sample 2 254.bmp | G:\haripriya\sample 2 366.bmp |

**DISCUSSION**

*Mukkadi yoga* is one such formulation explained in *Sahasrayogam Netra prakarana* *Sahasrayogam*, which is said to be useful in inflammatory signs and symptoms of eye i.e. *sopha, ruja, daha, raga* etc. It is widely used in *vranasophas* of *netras* like *anjana namika,utsangini* etc.

The present pharmacognostical study revealed the presence of starch grain cells, tannin and fibers and all these are common in all the ingredients. The presence of all contents of raw drugs in the final product shows the authenticity of the final product.

All the pharmaceutical parameters analyzed showed values permissible for the *churna*. The Physico-chemical parameters show that percentage of alcohol soluble material is more than water soluble extract. It also shows presence of slightly acidic nature of *Churna* which may help in augmenting the function of *Brajaka Pitta* ultimately work as a transdermal action.

HPTLC is the most common form of chromatographic method used by Ayurvedic research workers to detect the number of compounds present in a product. It also helps to determine the purity of the sample. The results shows that the active phytoconstituents are slight equaled sensitive for both UV radiation i.e. 254 nm & 366 nm but by comparison one spot more found in short UV radiation 254 nm.

**CONCLUSION**

The contents of *Mukkadi yoga* are predominantly *pittashamaka*, works on vitiated *pitta* and *rakta* and majority have haemostatic activity.

Preliminary organoleptic features and results of microscopy were cross verified with individual raw drug of *Mukkadi yoga* with the parameters mentioned in Ayurvedic Pharmacopeia of India and all the ingredients were proved to be authentic.

Pharmacognostical evaluation of *Mukkadi Yoga* illustrated the specific characters of all ingredients which were used in the preparation.

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In physico-chemical analysis, water soluble and alcohol soluble extract, pH, Ash values were assessed. So the pharmacognostical and phyto-chemical analysis of *Mukkadi Yoga* provides substantial information for the proper identification, authentication, and scientific evaluation of the final product/drug.

On the basis of observations made and results of studies, this study may be beneficial for future researchers and can be used as a reference standard in the further quality control researches.

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