Pharmacognostical and Physicochemical Evaluation of Mudga (Phaseolusradiates Linn.)

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Abstract
Phaseolus radiates is commonly known as Green gram (Mudga) belonging to family Fabaceae. Mudga (Phaseolus radiates linn) is described in Ayurveda under the classification of Shami Dhanya (Pulses). Mudga is considered best in the form of soup among all pulses. It is Kashaya (astringent) and Madhura (sweet) in taste, Katu (pungent) in Vipaka, Ruksha (ununctuous), Sheeta (cold), Laghu (light) and Vishada in properties. It alleviates the vitiated Khapha and Pitta. Mudga is one of the most cherished foods in the ancient holistic medicine practice. It is indicated for many diseases such as Agnimandya, Jwara (Fever), Prameha (Diabetes Mellitus), Sthaulya (obesity), Gulma, Kasa (Coughing), Atisara (Diarrhea) and Chhardi (Vomiting) etc. Hence, Mudga in the form of Yusha (soup) is selected for the management of Agnimandya. The present study was aimed at setting up a standard profile of Mudga through the Pharmacognostical and pharmaceutical analysis as per standard protocol. The observations were systematically recorded. Organoleptic features of coarse powder were harmonized with API. The pH value was 4, water soluble extract 13.9% w/w, methanol soluble extract 5.96%, ash value 3.7% and loss on drying 6.35%. HPTLC was carried out after organizing appropriate solvent system in which maximum 6 spots were distinguished at 254 nm and 1 spots at 366 nm.

Keywords
Agnimandya, HPTLC, Mudga, Pharmacognosy, Physico-chemical analysis
INTRODUCTION
Food has been a basic part of our life. Through the centuries we have attained wealth of information about the use of food to ensure growth of children and youth, to maintain good health through life and to use it to recover from disease. Certain foods are very important for maintain good health, while others are harmful.

One of the beneficial food is Green Gram, also known as Mung (Phaseolus radiates) and is native to the Indian subcontinent. Apart from India it is also cultivated in China, Thailand, Indonesia, Burma, Bangladesh, Laos, Cambodia and also in hot and dry regions of Southern Europe and the Southern United States. Suitable climate for cultivation of Green Gram should be warm humid and within temperature range of 25°C to 35°C, with moderate rains of 80-100cm, well distributed during growing period of 100days. In North India, it is cultivated during warm and wet season and in South India in mild winter season. It is cultivated on a variety of soils, from red laterite soils in South India to black cotton soils in North India and sandy soils in Rajasthan. To cultivate Green Gram a well-drained loamy to sandy loam soil is the best, while saline and alkaline soil or water logged soils are not at all suitable for cultivation.

In the present study Mudga (Phaseolus radiates linn.) was purchased from Market and the sample was analyzed pharmacognostically and physico-chemically. Whole cooked Mung beans are generally prepared from dried beans by boiling until they are soft. Mung beans are light yellow in colour when their skins are removed. Mung bean paste can be made by dehulling, cooking, and pulverizing the beans to a dry paste. Although whole Mung beans are also occasionally used in Indian cuisine, beans without skins are more commonly used; but in Kerala, whole Mung beans are commonly boiled to make a dry preparation often served with rice gruel. Dehulled Mung beans can also be used in a similar fashion as whole beans for the purpose of making sweet soups. Mung beans in some regional cuisines of India are stripped of their outer coats to make Mung dal.

Agnimandya is a condition in which activity of the Pachakagni (low digestive power) hampers, resulting in delayed or partial digestion or indigestion of food taken even in small quantity at proper intervals.

MATERIALS AND METHODS
The grains of *Phaseolus radiates Linn.* were collected from grain market, Jamnagar in the month of June and were authenticated in Pharmacognosy department, IPGT & RA, Gujarat Ayurved University Jamnagar. The grains were air-dried and were pulverized in a mechanical grinder to fine powder.

Parts used: Dried grain

**Pharmacognostical evaluation:**

Raw drug i.e., Mudga (*Phaseolus radiates Linn.*) was identified and authenticated by the Pharmacognosy department, I.P.G.T. & R.A., Gujarat Ayurved University Jamnagar. The study was done by Powder Microscopy of Mudga. The identification was carried out based on morphological features, organoleptic characters and powder microscopy of the drugs as mentioned in API. Microphotographs were taken by using Carl-Zeiss Trinocular microscope (Plate-1).

**Plate 1 Microphotographs-Mudga powder**

- Simple-Compound Starch grain
- Simple Starch grain
- Starch grains in group
- Simple Starch grain-Measures about 0.4mm
- Simple Starch grain-Measures about 0.6mm
- Compound starch grain Measures about 0.8mm
Compound starch grain
Measures about 0.7mm

Parenchyma cells with starch grain

Epicarp cells

Spool cells

Prismatic crystals

Oil globules

Epidermal cells with oil globules

Simple fibres

Annular vessels

Trichome

Lignified Fibre

**Pharmaceutical analysis:**
Following parameters were analyzed for different physico-chemical parameters by today’s routine methods at the pharmaceutical chemistry lab, IPGT& RA, Jamnagar. Parameters were selected on the basis of common parameters mentioned for powder in Ayurvedic Pharmacopoeia of India and CCRAS guidelines. Physico-chemical Parameters:

1. Loss on Drying
2. Ash Value
3. Water Soluble extract
4. Methanol Soluble extract
5. pH

High performance Thin Layer Chromatography study (HPTLC):

Methanol extract of Mudga was spotted on pre coated silica gel GF 254 aluminium plate as 5mm bands, 5 mm apart and 1 cm from the edge of the plates, by means of a Camag Linomat V sample applicator fitted with a 100 μL Hamilton syringe. Ethyl acetate: water: Acetic acid (8:1:1) were used as the mobile phase. After development, Densitometric scanning was performed with a Camag TLC scanner III in reflectance absorbance mode at 254nm and 366 nm under control of win CATS software. The slit dimensions were 6 mm×0.45 mm and the scanning speed was 20 mm per second.

All HPTLC plates were scanned with filter fraction Savitsy-goloy 7, minimum slope 5, minimum height 10 AU, minimum area 50 AU, and maximum height 990 AU with absorption unit.

RESULTS AND DISCUSSION

The initial purpose of the study was to confirm the authenticity of the raw drug used in the preparation of Mudga Yusha.

Organoleptic characteristics:

Organoleptic findings of Mudga powder is given in Table 1.

Pharmacognostical study:

Macroscopic:

Seed small, globular, about 0.4 cm long roughly rounded to square, smooth with white lateral hilum; usually green but sometimes yellowish-green; odour, not distinct; taste, slightly sweet.

Microscopy:

Microscopic findings are shown in Table 2. Microphotographs are shown in Plate 1. Results matched with the API and thus confirmed the genuineness of the raw drug.

Table 1 Organolaptic findings of Mudga powder
Morphological Characters | *Phaseolus radiatus*
---|---
Color | Greenish cream
Odour | Slightly aromatic
Taste | Madhura, Kashaya
Touch | Fine powder

Table 2 Characters found in *Mudga* seed

| Simple and Compound-Starch grain | Oil globules |
| Starch grains in group | Spool cells |
| Simple Starch grain-Measures about 0.4mm x 0.6mm | Simple fibres |
| Compound starch grain-Measures about 0.8mm x 0.7mm | Annular vessels |
| Parenchyma cells with starch grain | Trichome |
| Epidermal cells with oil globules | Lignified Fibre |
| Prismatic crystals | Epicarp cells |

**Pharmaceutical Evaluation:**

Physico-Chemical parameters of *Mudga* powder like Loss on Drying, Ash value, Water soluble extract, Methanol soluble extract, pH value all were found to be within the normal range. Details are given in Table 3. Results of HPTLC study is shown in Table 4. Densitogram of *Mudga* is shown in Plate 2.

In the present study a pharmaceutical preparation of *Mudga* powder was tried. Its pharmaceutical properties had to be studied; hence the material was subjected to minimum Pharmacognostical and Pharmaceutical analysis. Pharmacognostical evaluation of *Mudga* powder showed the specific characteristic features found in microscopy confirm the same and showed that the genuinity of the drug. Wrong dietary habits like *Adhyashana*, *Vishamashana* and wrong behavioural pattern like *Vegadharana* which lead to vitiation of *Tridoshas* independently or together which result in manifestation of disease *Agnimandya*. In Ayurveda, it is believed that *Agnimandya* is root cause for all diseases like *Prameha*, *Sthaulya* etc. *Mudga* soup is consider to be alleviating *Kapha* and is increasing digestive fire (appetizing) and pleasant. It forms the most wholesome diet to persons whose systems have been cleansed with the aid purgative and emetic remedies, as well as to those suffering from ulcers.

**CONCLUSION**

Pharmacognostical findings confirm the ingredients present in market sample. Raw drugs were cross verified with API and no major change was observed. When the raw drug was analyzed under the microscope, it is inferred that the formulation meets the minimum qualitative standards as reported in the API at a preliminary level. The results of this study may be used as the reference standard in advance research undertakings of its kind.
Table 3 Physico-Chemical parameters of *Mudga* powder

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Test</th>
<th>Mudga Powder</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Loss on Drying at 110(^{\circ})C</td>
<td>6.35 % w/w</td>
</tr>
<tr>
<td>2.</td>
<td>Ash Value</td>
<td>3.7 % w/w</td>
</tr>
<tr>
<td>3.</td>
<td>Water soluble extract</td>
<td>13.9 % w/w</td>
</tr>
<tr>
<td>4.</td>
<td>Methanol soluble extract</td>
<td>5.96 % w/w</td>
</tr>
<tr>
<td>5.</td>
<td>pH Value (5% v/w aqua solution)</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 4 Consolidated data of HPTLC profile of *Mudga* Powder

Solvent System: Ethyl acetate : water : Acetic acid (8 : 1 : 1)

<table>
<thead>
<tr>
<th>Condition</th>
<th>No. of spots</th>
<th>Max. Rf</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short UV</td>
<td>6</td>
<td>0.05, 0.19,</td>
<td>493.9, 292.7,</td>
</tr>
<tr>
<td>(254 nm)</td>
<td></td>
<td>0.55, 0.69,</td>
<td>841.0,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.83, 0.93</td>
<td>1645.5,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>872.4, 399.4</td>
</tr>
<tr>
<td>Long UV</td>
<td>1</td>
<td>0.59</td>
<td>747.8</td>
</tr>
<tr>
<td>(366 nm)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Plate 2 Densitogram of *Mudga* (254nm and 366nm)
REFERENCES

1. http://www.ipga.co.in/greengram
4. Database on Medicinal Plants Used in Ayurveda, Published by The central council of Research in Ayurveda & Siddha, New Delhi, Year of publication 2001, Volume 3, pp.561
5. Trease and Evans, Pharmacognosy, 15th ed. W.B. Saunders Company Ltd. 1996; pg.569-570