PHARMACOGNOSTICAL EVALUATION OF NAGAKESARA USED IN DIFFERENT PARTS OF INDIA

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ABSTRACT

Nagakesara though have no mentioning in Vedic literature is a widely mentioned drug in the Ayurvedic classics both in Brihattrayees and Laghattrayees. In Nighantukaala Nagakesara included in almost all Nighantus which mentions its prime importance and wide utility in therapeutics especially in disorders of GIT, skin and bleeding disorders. It has more than 20 synonyms. Modern literature mentions its considerable role in bleeding disorders and explanation regarding its morphological characters, habitat, chemical composition, characters and action. There is a need to study the position of Nagakesara in the crude drug market. It was found that there is a lot of confusion regarding the acceptance of genuine drug under the name Nagakesara. As there is scarcity and unavailability of Nagkesara, also due to lack of awareness, instead of Nagkesara the Pratindhidravya like Surpunnag, Punnag, Tamalpatra are used commonly. And gradually the use of real Nagkesara is diminished and the Ayurvedic Vaidya, teachers and students also understood the Pratindhidravyas of it as real Nagkesara.


INTRODUCTION

There is a huge surge on Ayurvedic plants in the planet and it has become a subject of intensive research for various aspects. There have also been substantial efforts to standardize the Ayurvedic crude drugs as well as finished Ayurvedic medicines. However, these initiatives would imperatively need establishing correct identity of the plant drug. The long history of safe usage of Ayurvedic medicines can be extrapolated only when the botanical identity of the plant going into those medicines is established and standardized. Hence proper nomenclature of all crude drugs and establishing their exact botanical origin is a must.[1] Even a physician well versed with the identification of green drug and laboratory based Phyto-chemical methods to assess the authenticity finds it difficult practically to test the genuineness of the raw materials while procuring from the market due to lack of guidelines. The modern methods like microscopy, chemical assay etc. are the methods that require trained persons and well equipped laboratories that are not available to common physician. Further these can be done only to verify the authenticity of the already procured drugs. Among the vast varieties of Ayurvedic drugs, the Nagakesara is a popular drug which is a tree of tropical Asia. The real Nagakesara is called Mesua ferrea Linn. which belongs to family Guttifereae. Kesara in Sanskrit means pollens. So stamens, pollens or whole flower of this tree is to be used in medicine. This is the real Naga champaka.[2] The flowers are said to be astringent, stomachic, expectorant and useful in bleeding piles, the flower buds are used in dysentery. Nagkesara helps in digesting the undigested food, cures fever, itching, thirst, excess perspiration, vomiting, nausea, bad smell, skin diseases, herpes, diseases of Kapha, Pitta and alleviates Visha.[3] But as there is scarcity and unavailability of Nagkesara, also due to lack of awareness; instead of Nagkesara, the Pratindhidravya like Surpunnag, Punnag, Tamalpatra are used commonly.[4] Nagakesara is mostly attributed to the stamens or the flowers of

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Mesua ferrea Linn. of the family Guttiferae. (Dymock 1885, Kirtiker and Basu B. D. 1918, Nadkarni K. M. 1908, Chopra, R. N. 1956, Chunekar. K. C. 1969). Recently the usage of dried fruiting inflorescence of Cinnamomum wightii Meissn of the family Lauraceae and dried fruits of Dillenia pentagyna Roxb. of the family Dilleniaceae has been reported (Usman. S. Ali 1967). Therefore there is an urgent need to evolve exclusive identifying features of raw drugs by organo-leptic methods along with the Phyto-chemical analysis so as to serve as a ready reference for all physicians in identification of genuine medicinal plant raw materials.[5]

VARIOUS SPECIES SOLD UNDER NAGAKESARA

Mesua ferrea Linn.

Mesua ferrea Linn. belonging to family Guttiferae is a source of Nagakesara. Useful part is stamen. It is a middle sized, glabrous tree, trunk is straight, erect smooth bark which is ash-coloured, young branches are twiggy, slender. Leaves are 7.5 - 12.5 by 2.5 - 3.8 cm oblong lanceolate, acute or acuminate, red when young, afterwards shingling above, glaucous and pruinose, beneath rounded or acute at the base and with close, inconspicuous nerves, petioles are 6-8 mm long. Flowers are very fragrant, 2.5 - 7.5 cm. in diameter, axillary or terminal, solitary or in pairs, subsessilemhunds, subglobose, bracts. Sepals are 4, orbicular, cupped, puberulous outside, presistent, the inner pair much longer than the outer, Petals are 4, pure white, Spreading, obovate undulate, with crisped and undulate margins, often torn. Stamens are very numerous, golden yellow, much shorter than the petals, slightly united at the base into a fleshy ring, anthers are oblong. Style is twice as long as the stamens, stigma is peltate. Fruits are 2.5 - 3cm. long, ovoid, ovate-oblong, acute, thin, deciduous, white streaked with red. Stamens are many, sterile in the female flowers. Style is short, stout; stigma is broad, peltate. Fruits are 2.5 cm. long, obliquely ovoid, tipped by the hard, pointed style, 1-seeded. Ochrocarpus longifolius Benth. & Hook is commonly distributed in Western Ghats of the Konkan, Northern Kanara, Malabar and Coimbatore and cultivated in the Northern Circars.[8][9] The flowers of Lal Nagakesara are fragrant, sweet, cooling, analgesic, stomachic, aphrodisiac; pacifies Kapha, dispel biliousness; good in blood diseases, leprosy etc. It is a tonic for heart, is antispasmodic, diuretic and emmenagogue. It exhibits significant anti-inflammatory and styptic activity. Main uses has been described in leucorrhoea and for controlling bleeding in menorrhagia and piles. Its use in menorrhagia may be due to its action on capillaries. Also useful in metrorrhagia, chronic dysentery with mucus, skin eruptions and haemoptysis.[10]

Dillenia pentagyna Roxb.

Dillenia pentagyna Roxb. belonging to family Dilleniaceae is a source of Malabar Nagakesara. The part used is dried fruit enclosed by calyces. It is a large deciduous tree grows up to 40 meters in height. Leaves are large, 1-2 ft, alternate, ovate-rhomboid, obtuse or acute. Flowers are yellowish, fragrant, 2-3 cm across, arise from the nodes of fallen leaves, on panicles. Fruits are 2.5 cm in diameter, globose which contain single seed. The flower-buds and young fruits have a pleasant, acid flavor and are eaten raw or cooked in south and central India. The ripe fruits are also eaten. Dillenia, named in honour of J. J. Dillenius (1684-1747), a noted botanist. Pentagyna in allusion to the flower having five styles.[11] Dillenia pentagyna Roxb. is distributed in Indo-Malaysian areas extending to tropical Australia; throughout India particularly in sub-tropical Himalayas, found in most places of Mizoram state, India.[12] The plant pacifies vitiates Vata, Kapha, anal fistula, wounds, diabetes,
Calophyllum inophyllum Linn.

It belongs to family Guttiferae and part used is bark and seed oil. Calophyllum inophyllum Linn. (Kamani) is a very handsome, small or middle-sized glabrous tree, with a crooked trunk; bark grey, smooth. Leaves are 10-18 by 7.5-10 cm. broadly elliptic, rounded at the apex, often emarginated, with waved margins and very close lateral nerves, giving a striate appearance to the blade; base acute; petioles are 9-15 mm. long, stout, flat. Flowers are 1.9-2.5 cm in diameter, pure white, fragrant, few-flowered racemes are 10-15 cm. long. Sepals are 4, ovate-orbicular, concave, reflexed. Petals are 4, oblong, obtuse, spreading. Stamens are numerous; filaments are united into 4-6 bundles. Style is long, twisted; Stigma large, mushroom-shaped. Fruits are globose, 2-3.8 cm. diam, smooth, yellowish; pulp is scanty. It grows along coastal areas and adjacent lowland forests, although it occasionally occurs inland at higher elevations. Calophyllum inophyllum Linn. is distributed along the Eastern and Western coasts of the Peninsula, Burma, the Andamans and Malaya Peninsula, Ceylon, Eastern African Islands, Malaya, Australia, Polynesia. Bark is hot with a sharp taste; heals ulcers and inflammation of the eye; destroys "Kapha" and "Vata;" lessens appetite; astringent; improves the digestion. The oil can also be used to dye to colour cloth. The oil can also be used to extract from the fruit was used to make a brown cloth and is used as a varnish. In the old days an infusion of the plant is used specifically for treating skin diseases. It is also applied topically in cases of rheumatism. The oil is useful in waterproofing cloth and is used as a varnish. In the old days an extract from the fruit was used to make a brown dye to colour cloth. The oil can also be used to make soap.[13][14]

Cinnamomum tamala Fr.-nees:

It is a small evergreen tree up to 1.4 m. girth and 7.5 m. high. Bark is dark brown or blackish, slightly rough. Leaves are opposite, sub opposite or alternate, 12.5-20 by 5-7.5 cm., ovate lanceolate or oblong, acuminate, the acumen often falcate, coriaceous, glabrous, scarcely shining above, glaucous beneath, 3-nerved from close above the base almost to the apex. Petiole 7.5-13 mm. long. Flowers are 7.5 mm. long, pale yellowish, in axillary and terminal lax puberulous panicles 5-15 cm. long. Perianth-lobes 6, oblong, silky pubescent, breaking off transversely below the middle after flowering. Filaments are villous. Drupe is 13 mm. long, ovoid, fleshy, black, supported by the enlarged perianth-tube bearing the truncated perianth-lobes. It is distributed throughout tropical and subtropical Himalaya upto 3,000-7,800 ft. The leaf is bitter, sweetish; useful in vitiated Vata, scabies, diseases of the anus and rectum, piles, heat troubles, bad taste. The essential oil of the leaves is used as carminative, anti flatulent, diuretic and in cardiac diseases.[15]

MATERIALS AND METHODS

The genuine sample of Mesua ferrea Linn. was collected from Herbal Garden of Rishikul Govt. Ayurvedic P.G. college and Hospital Haridwar (U.K.). Other drugs were collected from market and field survey from different places of our country as an authentic samples and for organoleptic macroscopic, microscopic and phytochemical study, namely- Nagakesara/ Yellow Nagkesara (Mesua ferrea Linn.), Red/ Ratan Nagakesara (Orchocarpus longifolius B & H), Black Nagakesara (Cinnamomum tamala fr.nees./ Cinnamomum wightii Meissn.), Punnag Nagakesara (Calophyllum inophyllum Linn.), Malabar/Bhavya Nagakesara (Dillenia pentagyna Roxb.). The market samples of drug sold under the name Nagakeshar were collected from different palaces like Amritsar (Sample -1), Delhi (Sample -2), Jaipur (Sample -3), Mumbai (Sample -4), Chennai (Sample -5), Kolkata (Sample -6), Haridwar (Sample -7), Lucknow (Sample -8). Details of sample collection are given in Table no. 1 (Fig. 1)

<table>
<thead>
<tr>
<th>Place</th>
<th>Collection Date</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amritsar</td>
<td>07/10/2009</td>
<td>Baba Drug House, Majith Mandi, Amritsar</td>
</tr>
<tr>
<td>Delhi</td>
<td>15/11/2009</td>
<td>Raw Market Khali Bowly, Delhi</td>
</tr>
<tr>
<td>Jaipur</td>
<td>10/01/2010</td>
<td>Chunnilal Kalyan Bux,Tripolia Bazar,Jaipur</td>
</tr>
<tr>
<td>Mumbai</td>
<td>12/02/2010</td>
<td>Dadar Pharmacy, Near jain Mandir, Mumbai</td>
</tr>
<tr>
<td>Chennai</td>
<td>08/03/2010</td>
<td>Raw Market, Chennai</td>
</tr>
<tr>
<td>Kolkata</td>
<td>22/05/2010</td>
<td>Suran Das and Company, Bada Bazar, Kolkata</td>
</tr>
<tr>
<td>Haridwar</td>
<td>18/06/2010</td>
<td>Chirayu Herbo Pharmacy and Rishikul Govt. Ayurvedic Pharmacy, Haridwar</td>
</tr>
<tr>
<td>Lucknow</td>
<td>28/06/2010</td>
<td>Lucknow Jadi Buti Aushdhi Kendra Rakabganj, Lucknow</td>
</tr>
</tbody>
</table>
SAMPLES IDENTIFICATION

Few field/market Samples of Haridwar and Chennai (Plant Material) were morphologically authenticated by CIF, NBRI, LUCKNOW with Ref.No. :NBRI/CIF/344/2012.

Procedure for Examination of Market Samples

- The market samples were spread thoroughly into a thin layer over the paper and examined through lens to find out presence of parts of plants like flower, buds, fruits, leaves, or any such parts showing cardinal feature that helps in exact identification of the sample.
- The dried leaves were soaked in water for 10-15 minutes and then carefully spread over the newspaper to establish the identity.

MARKET SURVEY

The attempt was made during survey of markets to collect information regarding trade name, local name, origin, time of collection of the sample drugs to the extent possible in addition to procurement of samples of crude drugs. An effort was made to collect authentic field samples of selected crude drugs along with substitutes of the plants and brief field notes has been recorded containing relevant inputs from the field and relevance of local names in establishing identity of a particular plant was discussed. The samples were subjected to organoleptic study to delineate features of identification. The market samples were subjected to comparative assessments, some simple tests and observation methods to establish identity. The main objective of the study was to study the position of Nagakesara in the crude drug market.
- On conducting survey in 8 different markets, it can be concluded that genuine Nagakesara is Mesua ferrea Linn. which is available in the name of ‘Yellow Nagakesara’ or ‘Flower of Nagakesara’.
- In Gujarat, Maharashtra and most parts of North India, Ochrocarpus longifolius Benth & Hook. is considered as Nagakesara and sold in the market with name ‘Lal (Red) / Ratan Nagakesar’. It is also known as Padma keshar.
- In south Indian states especially in Tamil Nadu (Chennai and Madhurai market), unripened fruits of Cinnamonum tamala N.E. or Cinnamonum wighti Meissn. is considered as Nagakesara and sold in the name of Black Nagakesara/ Karu / Siru Naagappu. This is widely used by the Siddha practitioners in the state. These varieties are commonly used as substitutes/adulterants for Nagakesara.
- In Malabar region, especially in Kerala, the Nagakesara is taken as Dillenia pentagyna Roxb. It is called as Bhavya or Malabar Nagakesor or Natttu Nagakesara.
- Apart from this, in all over India Calophylluminophyllum Linn. is another source widely used as a substitute for Nagakesara due to its resemblance with the floral buds of Surapunnaga (Ochrocarpus longifolia Benth & Hook.)
- In the raw drug market of Jaipur, Chennai, Amritsar and Lucknow, the material sold by the name of Nagakesara is the buds of Nagakesara, they do not supply flower or stamen of Nagakesara.
- In the raw drug market of Haridwar, Kolkata, Mumbai and Delhi, the drug was available in the form of flower & buds both. Hence both the samples were separately procured and taken up for study.

Organoleptic characters of different samples:
They are shown in Table no. 2.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Organoleptic Character</th>
<th>Sample 1</th>
<th>Sample 2</th>
<th>Sample 3</th>
<th>Sample 4</th>
<th>Sample 5</th>
<th>Sample 6</th>
<th>Sample 7</th>
<th>Sample 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Odour</td>
<td>Not significant</td>
<td>Sweetish Smell</td>
<td>Not significant</td>
<td>Unpleasant Not significant</td>
<td>Not significant</td>
<td>Sweetish Smell</td>
<td>Sweetish</td>
<td>Sweetish Smell</td>
</tr>
<tr>
<td>3.</td>
<td>Taste</td>
<td>Not significant</td>
<td>Sweetish</td>
<td>Not significant</td>
<td>Slightly Sweetish Not significant</td>
<td>Not significant</td>
<td>Sweetish</td>
<td>Sweetish</td>
<td>Sweetish</td>
</tr>
<tr>
<td>4.</td>
<td>Shape</td>
<td>Oval Rounded soft epicarp</td>
<td>Fleshy basal Sheath small filament</td>
<td>Oval Rounded soft epicarp</td>
<td>Oval Rounded</td>
<td>Oval Rounded soft epicarp</td>
<td>Fleshy basal Sheath small filament</td>
<td>Fleshy basal Sheath small filament</td>
<td>Fleshy basal Sheath small filament</td>
</tr>
<tr>
<td>5.</td>
<td>Foreign Organic matter</td>
<td>1-2 %</td>
<td>1-2 %</td>
<td>1-2 %</td>
<td>1-2 %</td>
<td>1-2 %</td>
<td>1-2 %</td>
<td>1-2 %</td>
<td>1-2 %</td>
</tr>
</tbody>
</table>
CONCLUSION

The discontinuity in the healing traditions of Ayurveda has led to confusion and controversies over the identity of many medicinal plants. The diminishing natural flora, ever increasing demand and lack of regulation has led to high level of adulteration. There is limitation of modern standardization methods in holistically evaluating the botanical raw materials. The original Nagakesara i.e. Mesua ferrea Linn. is found in major quantity in Assam and eastern Himalaya. So it is used as an ornamental plant there due to attractiveness and good fragrance by the local community in their gardens. But due to lack of knowledge of its medicinal properties, the flowers are not being collected, so there is lack of availability of Nagkesara. On conducting survey in 08 different markets it can be concluded that genuine Nagakesara i.e. Mesua ferrea Linn. is available in the name of ‘Yellow Nagakesara’ or ‘Flower of Nagakesara’. In south Indian states especially in Tamil Nadu (Chennai and Madhurali market) unripened fruits of Cinnamomum tamala N&E. or Cinnamomum wightii Meissn. is considered as Nagakesara and sold in the name of Black Nagakesara. In Malabar region, especially in Kerala the Nagakesara is taken as Dillenia pentagyna Roxb. It is called as Bhavya or Malabar Nagakesara. The present paper was a step towards the objective of developing organoleptic guidelines for practical identification of raw drugs, not the final word in this direction. The author strongly believe further research in this line involving other such controversial drugs.

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**Fig. 1:** Shows details of five samples where Sample -1 represents Amritsar sample, Sample -2 is of Delhi, Sample -3 of Jaipur, Sample -4 of Mumbai, Sample -5 from Chennai.

**Fig. 2:** Shows details of other three samples where Sample -6 represents Kolkata sample, Sample -7 is of Haridwar and Sample -8 is of Lucknow.