Pharmacogostistical study of Amalaki (Emblica officinalis Gaertn.)

Sadhana Singh, Vinay Verma, Rashmi Yadav and Brijesh Singh

Abstract
Ayurveda- The science of life of ancient origin is well recognize as traditional system of medicine. Currently global attention is being progressively focused on rediscovering and developing the indigenous system of medicine, Ayurveda and its utilization for Primary Health Care. In this review Botanical description, chemical constituent, Ayurvedic properties, formulation, dose, and pharmacological outcome of fruit of Emblica officinalis Gaertn. Are narrated. The present work deals with the pharmacognostical and preliminary phytochemical studies on fruit of Emblica officinalis Gaertn. Macroscopic and Microscopical Characters, physico-chemical constants, quantitative microscopy parameters, extractive values, TLC and HPTLC were studied. Preliminary phytochemical screening on fruit of Emblica officinalis Gaertn. Were studied. The discrimination of these characters will assist future researchers in their Phytochemical as well as Pharmacological analyses of this plant.

K-eeywords: Emblica officinalis gaertn, pharmacognosy, phytochemical, macroscopic, microscopic

Introduction
Botanical classification: According to Bentham & Hooker (1862-1883)
Kingdom: Planate
Division: Angiospermae
Class: Eudicots
Subclass: Archichlamydeae
Series: Unisexuals
Order: Malpighiales
Family: Euphorbiaceae
Group: Emblica
Species: Officinalis Gaertn.

Vernacular Names
Arabic: Amliy, Amlaj.
Assami: Amalaki, Amluki, sohmyrlain.
Bengali: Ambolati, Amla, Amalaki, Amulati, Anulah, Yeonlah.
Burma: Hziphyu, Shabju, Siphiyusi, Tasha, Zibyu, Ziphiyusi.
Cuttack: Alathanda
English: Emblic myrobalan tree
Gujarati: Amli, Ambala, Ambri, Amla, Bhoza, Bhozzmali.
Konkani: Anvallo, Dogranvalli, Dogranvallo.
Malayalam: Amalakam, Nelli.
Nepal: Amla.
Punjabi: Ambal, Ambli, Ambul, Amla, Aonla.
Sinhalese: Awusadanelli, Nelli, Nellika.
Telugu: Amalakamu, amalaki, Nelli, pullayusirika, Usirika, Usirikaya, Usiriki.
Tulu: Nelli.
Urd: Anwala.
Uriya: Khondona, Onola.

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Distribution and Habitat

Botanical description

A small or medium sized, deciduous tree.

Leaves: Subsessile, closely set along the branchlets, distichous, narrowly linear, obtuse, having appearance of pinnate leaves.

Flowers: Greenish-yellow, in axillary fascicles on the leaf bearing branchlets, often on the naked portion below the leaves.

Fruits: Fleshy, globose, with obscure vertical furrow, pale yellow.

Seeds: Seed 6, trigonous.

Part used: Root Bark, Stem bark, leaf, Fruit, Seed

Chemical constituents

Major
Ascorbic acid, chebulinic acid, chebulagic acid, 3-ethylgallic acid, gallic acid, ellagic acid, corilagin.

Other
Isostrictinin, Terchebin, Emblicanin -A and B, Punigluconin, Pedunculagin, trigalloyl glucose, Quercetin².

Image of Plant

Amalaki

Dry fruit Amalaki

Properties

Properties of Amalaki are as below [3, 4];
Rasa: Madhura, Amla, Katu, Tikta, Kasaya
Guna: Guru, Ruksa, Sita
Virya: Sita

Materials and Method

Macroscopic and Microscopic description of Amalaki as described in API

Macroscopic

Drug consists of curled pieces of epicarp and mesocarp of dried fruit occurring either whole or as separated single segment 1 to 2 cm long or united as 3 or 4 segments; bulk colour grey to black, pieces showing, a broad, highly shriveled and wrinkled; external surface convex to somewhat concave, transversely wrinkled showing a few whitish specks; occasionally some pieces may show a portion of stony endocarp; fracture, tough, cartilaginous, taste, sour and astringent; seeds and endocarp must be within the limits prescribed for foreign matter (Ayurvedic Pharmacopoeia of India, Part I, Volume VIII, First edition 2011).

Macroscopic

TS of pericarp of fruit shows epicarp consisting of a single layer of epidermis, cell appearing tabular and polygonal in surface view; cuticle present; a few small rosette crystals of calcium oxalate present in epidermal cells; mesocarp cells tangentially elongated parenchymatous and cell with walls showing irregular thickenings; ramified vascular elements occasionally present, lignified having wide lumen; stone cells present, either isolated or in small groups toward endocarp; pitted fibers with walls appearing serrated due to the pit canals leading into lumen, present (Ayurvedic Pharmacopoeia of India, Part I, Volume VIII, First edition 2011).

Powder microscopy of fruit powder of Amalaki

Coarse powder of grayish white, dark brownish or black in colour. In microscopic powder study it shows lignified tissues of brown in colour. Aleurone grains of green to brown colour, and prismatic crystals of silica of brown colour are seen [9].

Table 3: Microscopical Characteristics of Powdered Amalaki Fruit

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Reagents</th>
<th>Observations</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Phloroglucinol + Conc. HCl</td>
<td>Pink</td>
<td>Lignified Vessels</td>
</tr>
<tr>
<td>2</td>
<td>Dil. Sulphuric Acid</td>
<td>White</td>
<td>Calcium oxide crystals</td>
</tr>
<tr>
<td>3</td>
<td>Alcoholic Picric Acid</td>
<td>Yellow</td>
<td>Starch grains</td>
</tr>
<tr>
<td>4</td>
<td>Sudan Red III</td>
<td>Red</td>
<td>Oil globules and cuticles</td>
</tr>
</tbody>
</table>

Powder microscopy of fruit powder of Amalaki

Lignified Tissues
Genuine sample of amalaki gave the presence of following phytochemicals

<table>
<thead>
<tr>
<th>Phytoconstituents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkaloids                 +</td>
</tr>
<tr>
<td>Glycosides                +</td>
</tr>
<tr>
<td>Flavonoids                +</td>
</tr>
<tr>
<td>Steroid                   -</td>
</tr>
<tr>
<td>Phenolic &amp; tannins        +</td>
</tr>
<tr>
<td>Terpenoid                 -</td>
</tr>
<tr>
<td>Sterol                    -</td>
</tr>
<tr>
<td>Carbohydrates             -</td>
</tr>
<tr>
<td>Proteins                  +</td>
</tr>
<tr>
<td>Amino Acids               +</td>
</tr>
</tbody>
</table>

(+) indicate present, (-) indicate absent

**TLC of hydroalcoholic extract of amalaki**

Thin layer chromatography is a technique in which a solute undergoes distribution between two phases, a stationary phase acting through adsorption and a mobile phase in the form of a liquid [10].

**Mobile phase**: A mixture of 6 ml of Toluene, 6 ml of Ethyl acetate, 1.8 formic acid, 0.25 methanol.

**Heat**: Heat at 110 °C for 10 minutes and examines the plate under day light.

**Solvent system** [Toluene: Ethyl acetate: formic acid: methanol (6:6:1.8:0.25)]

**For Spot 1**

\[
Rf \text{ Value} = \frac{2.1}{5.5} = 0.38
\]

**For Spot 2**

\[
Rf \text{ Value} = \frac{2.8}{5.5} = 0.509
\]

**For Spot 3**

\[
Rf \text{ Value} = \frac{3.5}{5.5} = 0.636
\]
HPTLC of hydroalcoholic extract of Amalaki

High performance thin-layer chromatography (HPTLC) is an enhanced form of TLC (thin layer chromatography).

Methodology

- 0.3g of extract was dissolved with 1 ml of water and 1ml of ethyle alcohol and 3, 6 and 9µl of the above extract was applied on a pre-coated silica gel F254 on aluminum plates to a band width of 7 mm using Linomat 5 TLC applicator.
- The plate was developed in Toluene: Ethyl-acetate: formic acid: methanol (6:6:1.8:0.25). The developed plates were visualized in UV 254 and 366 and scanned under UV 254 and 366 nm. Rf of the spots and densitometric scan were recorded.

<table>
<thead>
<tr>
<th>Peak</th>
<th>Start Rf</th>
<th>Start Height</th>
<th>Max Rf</th>
<th>Max Height</th>
<th>Max %</th>
<th>End Rf</th>
<th>End Height</th>
<th>Area</th>
<th>Area %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-0.03</td>
<td>38.9</td>
<td>-0.03</td>
<td>41.5</td>
<td>1.15</td>
<td>-0.01</td>
<td>0.0</td>
<td>372.1</td>
<td>0.18</td>
</tr>
<tr>
<td>2</td>
<td>-0.01</td>
<td>0.4</td>
<td>0.04</td>
<td>755.8</td>
<td>20.94</td>
<td>0.05</td>
<td>674.2</td>
<td>19765.2</td>
<td>9.66</td>
</tr>
<tr>
<td>3</td>
<td>0.05</td>
<td>676.4</td>
<td>0.06</td>
<td>703.7</td>
<td>19.50</td>
<td>0.08</td>
<td>555.8</td>
<td>14410.4</td>
<td>7.04</td>
</tr>
<tr>
<td>4</td>
<td>0.08</td>
<td>556.1</td>
<td>0.11</td>
<td>584.5</td>
<td>16.19</td>
<td>0.13</td>
<td>544.6</td>
<td>17063.5</td>
<td>8.34</td>
</tr>
<tr>
<td>5</td>
<td>0.13</td>
<td>544.8</td>
<td>0.34</td>
<td>713.8</td>
<td>19.78</td>
<td>0.38</td>
<td>229.6</td>
<td>114768.0</td>
<td>56.06</td>
</tr>
<tr>
<td>6</td>
<td>0.38</td>
<td>228.1</td>
<td>0.40</td>
<td>338.3</td>
<td>9.37</td>
<td>0.43</td>
<td>187.3</td>
<td>8439.0</td>
<td>4.12</td>
</tr>
<tr>
<td>7</td>
<td>0.43</td>
<td>187.8</td>
<td>0.53</td>
<td>443.2</td>
<td>12.28</td>
<td>0.60</td>
<td>11.9</td>
<td>28759.6</td>
<td>14.05</td>
</tr>
<tr>
<td>8</td>
<td>0.61</td>
<td>11.1</td>
<td>0.66</td>
<td>28.8</td>
<td>0.80</td>
<td>0.69</td>
<td>6.4</td>
<td>1136.4</td>
<td>0.56</td>
</tr>
</tbody>
</table>

Discussion & Conclusion

Plants have played a significant role in maintaining human health and improving the quality of life for thousands of years and have served human as well as valuable components of medicines, seasoning, beverages, cosmetics and drugs. The plants are used in medicine since antiquity. Rigveda, one of the oldest Veda had quoted the use of plants in medicine. Much of the medicinal plants are documented in the old medical sciences like Ayurveda. Nearly five hundred plants of vegetable origin are documented in Caraka Samhita and Sushruta has given the number of plants 573 in Sushruta Samhita. These plants are still used successfully to treat different ailments. The use of the plants depends on the basic theories brought up by ancient scholars. Number of pharmacological activities is attributed to these plants. Quotations of wonder and miracle plants are also found in literature. However, these plants require detailed taxonomical and pharmacological studies. “Pharmacognosy” is meant by identification of drugs by its every aspect, habit, cultivation, procurement, micro and macroscopic characters, physical and chemical properties etc. [11].

In present study pharmacognostical standards have been established with regards to Fruit of Emblica officinalis Gaertn. In Powder microscopy of Fruit of Emblica officinalis Gaertn. Showed the presence of lignified tissues, Aleurone grains and prismatic crystals of silica on physiochemical analysis, the moisture content was found in-Amalaki 6.8%. The Total ash was found 4.55%; Acid insoluble ash was 1.9%, and; water soluble ash was 1.6% in fruit of Amalaki. The phytochemical investigation shows the presence of Alkaloids, Glycoside, Flavonoids, tannins, Protein, Tannins and Phenolic Compounds in the fruit of Emblica officinalis Gaertn. The TLC and HPTLC was performed and the developed plates were visualized in UV 254nm, 366nm.

References

2. Quality standards of Indian Medicinal Plants,Indian council of Medical Research New Delhi, 2010; 8:164.
9. Quality standards of Indian Medicinal Plants, Indian council of Medical Research New Delhi. 2010; 8:164