A REVIEW ON AN ENDANGERED HIMALAYAN MEDICINAL AROMATIC PLANT - CHORAKA (ANGELICA GLAUCA EDGEW)

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ABSTRACT
Choraka is a highly valued aromatic plant endemic to the Himalayan region. Angelica glauca is a perennial herb of Umbelliferae family. It is very commonly used as a spice and for treating stomach ailments. Its essential oil is highly valued and has broncho-relaxant, antimicrobial, antifungal, anxiolytic and antioxidant activity. Its chemical constituents are mainly (Z)-ligustilide, (Z)-butylidenephthalide, and (E)-butyl idenephthalide. It has been in use since the period of Arthashastra and references can also be seen in Brihatrayi and various Nighantus for Mukha and Nasa roga chikitsa. Ruthless uprooting of the plant from its natural habitat for its sale in the market has led to a considerable decline in its availability. This article deals with its distribution, uses in Ayurveda with classical references, controversies and the threats faced by the plant.

Keywords: aromatic, broncho-relaxant, choraka, endangered, essential oil, himalayas

INTRODUCTION
The Himalayan Range has always been of utmost importance to India. It is a spiritual abode, a border, a protective cover, reason for rainfall and replenishment of the River system of India. Ayurveda has considered the Himalayas as best among Aushadha bhoomi. This article deals with a Himalayan drug, Choraka aka Choru in the local language. Choraka i.e. Angelica glauca Edgew. of Umbelliferae / Apiaceae family, is a
critically endangered Himalayan perennial herb which has been included in IUCN red list (2013)\(^1\). Its aromatic and medicinal value is so immense that it is considered as one of the top three prioritized medicinal plants of Western Himalaya.\(^2\) It is usually distributed at altitudes of 2000-4000 meters world-wide\(^3\) with height ranging between 1.2 to 3.6 meters, having tuberous roots (20-50 cm thick and spongy). In the Indian sub-continent, it is an endemic medicinal plant of the Himalayas, which is distributed in Uttarakhand, Jammu & Kashmir and Himachal Pradesh.\(^4\) As the roots and seeds of Choraka are aromatic, they are used as a condiment and spice in hills and also as a flavoring agent in various food items. Local people use oil extracted from dried roots of Choraka for massage. They utilize its roots for preparation of local alcoholic drink for personal medicinal use. The roots are also used in the preparation of gin and the liqueurs known as bitters.\(^5\) Choraka is collected by inhabitants of Western Himalaya from wild habitat as a source of food and medicine and is sold at the local and national level due to its huge market and medicinal value. The unsustainable practice of uprooting the whole plant while collecting Choraka from its natural habitat has placed it in the list of critically endangered plants of the Himalayas. Researches have been performed for its in situ and ex situ conservation.\(^6\) The aroma of Choraka is pungent with a sweet-bitter taste. The roots yield a pale to brownish-yellow essential oil. Roots can be collected and dried during September-October.\(^7\)

**Uses**
The roots are known to be cardioactive and stimulant. Due to their carminative action, these are useful in stomach ailments of adults and children. These are expectorant, diaphoretic; and also used in rheumatism and urinary disorders.\(^8\) The powdered roots mixed with cow’s milk are used to treat bronchitis.\(^9,10\) These are also used to cure bilious complaints, menorrhagia, infantile atrophy and rinderpest.\(^11\) Recently, the popularity of Angelica has increased much in the United States. It is often acclaimed by herbalists as a treatment for flatulence, stomach pains and as a stimulant to stimulate circulation and warm the body.\(^12\)

### Choraka in Classics

#### Pre Samhita Kaala

| Kautilya’s Arthashastra | • Kautilya has referred Choraka as a type of spice and has included it in Tikta varga in Chapter 15 of Arthashastra dealing with The Superintendent of Storehouse.\(^13\) |

#### Samhita Kaala

| Susruta Samhita | • Classified Choraka in Eladi gana as Chanda. Dalhana has commented it as Choraka bheda.\(^14\) |
| | • Mentioned Choraka as Taskara in making Anuvasana basti.\(^15\) |
| | • Mentioned as Tilaparnika (Commented as Choraka by Dalhana) which is used for making Krtanna.\(^16\) |

#### Charaka Samhita

| | • Included Choraka under Sanjnasthapanama mahakashaya.\(^17\) Charaka has used Choraka in various external applications for Kushtha, Shirashoolaa\(^18\) and Sheeta nashana. Here word Chanda is used instead of Choraka and is clarified by commentators Chakrapani and Yogendranath Sen.\(^19\) |
| | • Mentioned in fumigation of clothes, bedsheets and beds in Kumaragara with ghee.\(^20\) |
| | • Content of Maha Paishachika Ghrita in Unmada.\(^21\) Ghrita made with Choraka has been used in Unmada Chikitsa\(^22\) and Vata Sleshmatmaka Apasmara Chikitsa.\(^23\) |
| | • It is also being used as a Taila for Abhyanga, as a Dhoopana dravya\(^24\) and also for Utsadana\(^25\) in Apasmara. |
| | • An ingredient in Shatyadi Churna in Hikka Shwas Chikitsa.\(^26\) |
| | • Its Kashaya is used for making Utkarika in Madana Kalpa.\(^27\) |
### Ashtanga Sangraha & Ashtanga Hridaya
- It is mentioned along with Dhamargava for Vamana in Manovikara.\(^{28}\)
- Mentioned in Snehapana Vyapar.\(^{29}\)
- Ashtanga Hridaya has included Choraka under Eladi Gana. Arunadatta and Hemadri have commented it as Granthiparna.\(^{30}\)
- It is used for inhalation in Pratishyaya in Nasaroga Pratishedha.\(^{31,32}\)

### Kasyapa Samhita
- Choraka is mentioned along with other drugs for Dhoopana in Moha.\(^{33}\)

### Nighantu Kaala

<table>
<thead>
<tr>
<th>Nighantu Kaala</th>
<th>Medicinal Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dhanvantri Nighantu(^{34})</td>
<td>Chandanadi varga</td>
</tr>
<tr>
<td>Madanapala Nighantu</td>
<td>Karpooradi varga</td>
</tr>
<tr>
<td>Sodhala Nighantu(^{35})</td>
<td>Chandanadi varga</td>
</tr>
<tr>
<td>Raja Nighantu</td>
<td>Chandanadi varga</td>
</tr>
<tr>
<td>Kaiyadeva Nighantu(^{36})</td>
<td>Aushadhi Varga</td>
</tr>
<tr>
<td>Saligrama Nighantu(^{37})</td>
<td>Karpuradi varga</td>
</tr>
<tr>
<td>Nighantu Adarsa</td>
<td>Eladi gana</td>
</tr>
<tr>
<td>Bhavap rakasha Nighantu</td>
<td>Karpuradi varga</td>
</tr>
<tr>
<td>Abhidhanamanjarai(^{38})</td>
<td>Madanadi gana Eladi Varga CH 31, As a synonym of Shathi and as synonym of Chanda</td>
</tr>
<tr>
<td></td>
<td>In Shookadhanyadi varga as Sarvoushadhi varga</td>
</tr>
<tr>
<td></td>
<td>Shati, Swetha Karpoora and Choraka are known as Ugra in Sankeerna varga in Tryartha Varga.</td>
</tr>
<tr>
<td>Abhidhanaratnamala(^{39})</td>
<td>Katu skandha</td>
</tr>
<tr>
<td>Ashtanganighantu(^{40})</td>
<td>Eladigana</td>
</tr>
<tr>
<td>Madanadi nighantu(^{41})</td>
<td>Eladi ganam</td>
</tr>
<tr>
<td>Saraswati Nighantu(^{42})</td>
<td>Chandanadi Varga</td>
</tr>
<tr>
<td>Sousrutha Nighantu(^{43})</td>
<td>Eladi gana</td>
</tr>
</tbody>
</table>

**Rasa panchaka according to different nighantus:**

<table>
<thead>
<tr>
<th>Nighantu Kaala</th>
<th>Rasa</th>
<th>Guna</th>
<th>Veerya</th>
<th>Vipaka</th>
<th>Karma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dhanvantari Nighantu</td>
<td>Tikta</td>
<td></td>
<td></td>
<td></td>
<td>Visharaktantakara, Kushtha Kanduhara, Vranahara, Krimihara, Vatahara</td>
</tr>
<tr>
<td>Raja Nighantu(^{44})</td>
<td>Tikta</td>
<td>Ushna</td>
<td></td>
<td></td>
<td>Vata kaphahara, Nasa mukha rogahara, Krimihara, Rujahara, Ajeernahara</td>
</tr>
<tr>
<td>Kaiyadeva Nighantu</td>
<td>Madhura, Tikta, Katu</td>
<td>Laghu, Tikshna</td>
<td>Katu</td>
<td>Hrdya, Kushtahara, Kanduhara, Kaphavatohara, Rakshoghna, Swedahara, Medohara, Raktaja vikarahara, Jwarahara, Gandhahara, Vishahara, Vranahara</td>
<td></td>
</tr>
<tr>
<td>Madanapala Nighantu(^{45})</td>
<td>Madhura</td>
<td>Laghu</td>
<td>Sheeta</td>
<td>Kushtahara, Vata kaphahara, Asrajith</td>
<td></td>
</tr>
<tr>
<td>Shaligrama Nighantu</td>
<td>Madhura, Tikta</td>
<td>Laghu, Tikshna</td>
<td>Katu</td>
<td>Hrdya, Vata vikarahara, Kandu Kushtahara, Kaphahara, Swedahara, Twak doshahara, Vranahara, Medohara, Raka doshahara, Mukha Nasarujahara, Krmharai, Ajeernahara, Daurgandhyahara, Alakshmi nashanam</td>
<td></td>
</tr>
</tbody>
</table>
Controversy:
Bhavaprakasha Nighantu has included Choraka (Bhateur) under Karpoo radi Varga. He mentions it as a controversial drug and as a variety of Granthiparna. Some have considered Sthouneyaka and Choraka as the same plant.  

Choraka in Ayurveda
Synonyms: Taskarah, Kshemaka, Chanda, Ripu, Kityava, Ganahasa, Kopanaka, Dushpatra, Shankhanika, Phalchoraka, Shukla, Ardrakanda, Granthisheshi, Keshini, Nishachari, Kshemika, Dhanya, Dhanavati, Vernacular name: Choru, Gandrayan (Hindi), Choraka Pallu (Malayalam), Gaddi Davanamu (Telugu). 

Properties and Action  

Important Formulations: Guduchyadi modaka, Bala ashwagandhadi lakshadi taila, Maha narayana taila. It has been mentioned as Sheeta veerya in Kaiyyadeva Nighantu and Dhanwantari nighantu, but Ushna veerya in Raja nighantu. API has accepted it as Ushna veerya.

Chemical constituents:
80% methanol extract of dried roots of plant: (Z)Lingustilide C12H18O2, (Z)Butyldinephthalide C12 H24 O2 Methyl Octadecadionate C18 H34 O2 Caryophyllene C15 H24, Caryophyllene Oxide C15 H24 O.  

Essential oil: The essential oil of root is a pale yellow to a deep amber liquid having warm, pungent, and spicy odour with musty/earthy top note and bittersweet flavour. The yield of roots ranges from 0.3 - 0.4%.  

Whole plant Hydrodistillation: phellandrene (18.0%), pinene (14.0%), trans-carveol (16.4%), caryophyllene (8.6%), and caryophyllene oxide (8.0%).  

Aerial parts Hydrodistillation: phellandrene (13.5%), trans-carveol (12.0%), pinene (11.7%), thujene (7.5%), caryophylleneoxide (7.2%), caryophyllene (7.0%), terpinene (6.7%), nerolidol (6.5%), and bisabolene (5.2%).  

Root Hydrodistillation: (Z)-ligustilide (40.6–53.0%), (Z)-butyldinephthalide (20.7–32.8%), and (E)-butyldinephthalide (2.5–5.9%).

Pharmacological activities
1. Broncho relaxation: On evaluation of broncho-relaxant activity of A. glauca essential oil in histamine and ovalbumin (OVA)-induced broncho constriction in guinea pigs and mice respectively, it was found that its oral treatment (200 μL/kg) significantly increased the latency for PCT in histamine-induced guinea pigs suggesting bronchodi-lating activity of A. glauca oil against histamine. Oral treatment of A. glauca oil significantly (P < 0.001) decreased absolute blood eosinophil count, serum level of IgE and the number of eosinophils, neutrophils in BALF.  

2. Antioxidant activity: IC50 value 32.32 μg/mL of A. glauca oil exhibited considerable free radical scavenging activity. When DPPH scavenging activity of the oil was compared with synthetic antioxidant BHT, the oil provided weaker activity.  

3. Antimicrobial activity: A sensitivity ordering of Escherichia coli > Staphylococcus aureus > Pasteurella multocida > Bacillus subtilis was seen when oil of A. glauca was set for testing its antimicrobial activity. Overall, A. glauca oil possessed antibacterial activity comparable with the standard drug, Amoxycillin.  

4. Antifungal activity: Antifungal activity of oil from A. glauca was comparable with the standard drug (flumequinene). The order of sensitivity of selected fungal strains are Microsporum canis > Fusarium solani > Candida albicans > Aspergillus flavius.  

5. Phytotoxic activity: The essential oil of A. glauca shows good in vitro phytotoxic activity against Lemana minor. Six coumarins from A. glauca are reported by Saeed and Sabir that possess potential irritant and cytotoxic activities.  

6. Anxiolytic activity: Methanolic extract of A. glauca was studied at graded doses to evaluate its anxiolytic activity which was assessed by behavioural observations conducted through elevated plus maze, open field and hole-board test and equated with control and standard control. Results showed that A. glauca possesses anxiolytic property.
Limiting Factors
Currently, Choraka products are standardized and packaged and are available as crude plant parts (dried roots, stems, and seeds), or as semi-purified preparations (crude extracts, essential oils, and powder). Its dried rhizome is priced around Rs. 1500 per kg; and seeds are sold at a much higher price in Uttarakhand. In Himachal Pradesh, the turnout of A. glauca during was reduced from 9 tons (2002–2003) to 0.2 (2003–2004) ton indicating a rapid loss of this species in the wild. The excessive grazing by heavy body animals (buffalos, cows, and mules) has led to excessive soil erosion, destruction of natural vegetation, and its conversion into artificial grasslands. The peak grazing period of sub-Alpine and Alpine region is from May to September when in addition to local livestock, the migratory community (Gujjar) also goes in the region for grazing. This period corresponds to that of growth and seed maturation period of A. glauca. Therefore, in order to conserve the plant, there should be a balance between grazing in alpine areas and management of MAPs. The economic viability of cultivation of A. glauca has also been assessed by benefit-cost ratio and was found that its cultivation could act as an additional source of income to the farmers, especially if they make their own vermicompost for its growth.

DISCUSSION
Choraka is a medicinal, aromatic plant with limited distribution to those of the Himalayas. Though it has many medicinal properties, on close examination, it can be noticed that it works mainly on Pranavaha srotas and Annavaha srotas. Its Ushna veerya and Katu vipaka makes it Vata kaphahara and Medohara. It can also be seen that its Gandhatva (Prithvi mahabhoota) is utilized more in its uses. It is reflected in its Samnjasthapana and Dowrandhyahara property. Its aromatic property also supports its use in Fumigation, Inhalation and Rakshogha karma. While assessing the Vargeekarana in Nighantus, it can be seen that it is included under aromatic groups like Chandanadi Varga, Karpooradi varga and Eladi varga. Its aroma has led to the utilization of its essential oils with an average yield of 0.3-0.4%. Researches have been done, and much more has to be done in this direction. Its anti-microbial and antifungal activity may be the reason for its use in fumigation and inhalation. Its Broncho relaxant activity corresponds to its use in Mukha nasa roga. Its anxiolytic activity supports its use in Unmada and Apasmara. Although it is a plant with high medicinal value, the Ayurveda community is facing a shortage in its availability. Unscrupulous uprooting, grazing and availability of less suitable time for cultivation due to extremes of climate in the Himalayas have led to its inclusion in the endangered plant list. Studies are being conducted for its conservation and in vitro, in situ cultivation. Cultivation of Choraka by Himalayan farmers may also increase their income as it is highly priced in the market. Promoting agriculture can also help in meeting its increasing demand in Ayurveda medicine manufacturing industry.

CONCLUSION
Choraka is a high-value plant with a variety of uses in medicine and perfumery. A balance between its cultivation and usage has to be maintained to prevent it from being extinct. More researches have to be done in its antipyretic action and its effects in skin disorders which have not been explored much even though it is mentioned in Nighantus.

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