**CENTELLA ASIATICA L.: A CONCISE DRUG REVIEW WITH PROBABLE CLINICAL USES**

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**ABSTRACT**

Centella asiatica L. is widely used as a medicinal herbs and alternative medicine in treating numerous kinds of diseases since prehistoric times. It is a perennial, creeper, faintly aromatic and a valuable medicinal herb of both Old World and the New World. The use of Centella in food and beverages has increased over the years basically due to its beneficial functional properties. Its potential antioxidant, antimicrobial, cytotoxic, neuroprotective and other activities have been widely claimed in many reports. The requirement of Centella asiatica is now met from natural population, leading to their gradual depletion and thus followed by its placement in the list of threatened species as mentioned by IUCN. It is distributed throughout tropical and subtropical regions of World such as Bangladesh, India, China, Nepal, Madagascar, Sri Lanka and Indonesia etc. The present review is an up-to-date and comprehensive literature analysis of the chemistry and various health beneficial functional properties of the Centella plant.

**Keywords:** Centella asiatica, food beverage, antioxidant, pharmacology, neuroprotective.

**INTRODUCTION**

Plants have been enumerated as an eminent basis of medicine since immemorial past. Drugs based on the plants are of prime importance for several remedies in traditional and conventional medicine throughout the world and serves as a substitute for drug supply in modern medicine. In recent times, focus on plant research has increased all over the world and a large body of evidence has been accumulated to highlight the immense potential of medicinal plants used in various traditional systems of medicine. *Centella asiatica* (CA) is a very important medicinal herb used in the orient, which is also becoming popular in the West. In the developing countries, approximately 80% of the populations still rely on the traditional medicine derived from the plants for health care needs [1-4].

**Vernacular names in different regions**

*C. asiatica* has been named by an array of vernacular names throughout the world [5-7]

<table>
<thead>
<tr>
<th>Region/Language</th>
<th>Vernacular Name</th>
<th>Region/Language</th>
<th>Vernacular Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh</td>
<td>Thankuni, Tholkuri</td>
<td>Nepal</td>
<td>Ghod iapre</td>
</tr>
<tr>
<td>India</td>
<td>Bemgsag, Brahma-Manduki</td>
<td>Cook Islands</td>
<td>Kapukapu</td>
</tr>
<tr>
<td>USA</td>
<td>Indian Pennywort, Marsh Pennywort</td>
<td>Tahiti</td>
<td>Tohetepou</td>
</tr>
<tr>
<td>China</td>
<td>Fo-ti-tieng, Chi-hsueh-ts’ao</td>
<td>Fiji</td>
<td>Totodro</td>
</tr>
<tr>
<td>Hawaii</td>
<td>Pohe Kula</td>
<td>Samoa, Tonga</td>
<td>Tono</td>
</tr>
<tr>
<td>Malaysia</td>
<td>Pegaga</td>
<td>Europe</td>
<td>Gotu Kola</td>
</tr>
<tr>
<td>Indonesia</td>
<td>Pegagan, kaki kuda</td>
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</tr>
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</table>

**Nutritive composition of Centella asiatica**

Quantitative interpretation reveals that *C. asiatica* comprises high amount of water. Besides, it also serves as a good source of various macro and micronutrients, proteins and vitamins, such as ascorbic acid, thiamine and carotene [8]. The details of composition are listed in the table [7].

<table>
<thead>
<tr>
<th>Composition</th>
<th>Value</th>
<th>Composition</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture</td>
<td>84.6%</td>
<td>Ascorbic acid</td>
<td>11</td>
</tr>
<tr>
<td>Protein</td>
<td>2.4%</td>
<td>Thiamine</td>
<td>0.04</td>
</tr>
<tr>
<td>Fiber (per 100 g)</td>
<td>5.43g</td>
<td>Carotene</td>
<td>25.93</td>
</tr>
<tr>
<td>(insoluble dietary)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soluble dietary</td>
<td>0.49g</td>
<td>β Carotene</td>
<td>3.90</td>
</tr>
<tr>
<td>Ca (mg/100 g)</td>
<td>174</td>
<td>Mg</td>
<td>87</td>
</tr>
<tr>
<td>P</td>
<td>17</td>
<td>Fe</td>
<td>14.86</td>
</tr>
<tr>
<td>K</td>
<td>345</td>
<td>Zn</td>
<td>0.97</td>
</tr>
<tr>
<td>Na</td>
<td>107.8</td>
<td>Cu</td>
<td>0.24</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cr</td>
<td>0.046</td>
</tr>
</tbody>
</table>

**Traditional Uses**

*C. asiatica* L. is a classic ethno medicinal species used by tribal groups and also by ancient civilizations. Some of the important traditional Socio-Economic uses of this marvelous herb *Centella asiatica* in different countries and in different ways are illustrated as

In Bangladesh, whole plant is utilized by Kavirajes (a community of Chalna area, Bangladesh) to treat multiple ailments like dog bite, asthma, carminative, itching, leucorrhoea, malaria, tumor and wounds [5, 9].

In India, *Centella asiatica* is valued as an ethno medicine as well as in Ayurveda and Unani, the traditional Indian medicinal systems for thousands of years for different ailments like asthma, skin disorders, ulcers and body aches [10-14] for improving memory, as a nerve tonic and in treatment of dropsy, elephantiasis, gastric catarrh, kidney troubles, leprosy, leucorrhoea and urethritis in maternal health care [15] in treatment of stomach disorders and also as a vegetable [16]. It is also used in the form of cover crop in rubber and tea plantations.

In Sri Lanka, the leaves of *C. asiatica* are used as “mallung” which is a traditional curry and in the porridge known as “kolakenda” to combat malnutrition [17]. Extract of the *C. asiatica* is also used in the production of food products, i.e. herbal noodles [18].

In Nepal, also this herb is used traditionally in rheumatism, indigestion, leprosy, poor memory [5].

In China, The traditional Chinese function include the use of this herb for dysentery and summer diarrhea, vomiting, jaundice and scabies, Hansen’s disease (leprosy), nosebleeds, tonsillitis, fractures, measles, tuberculosis, urinary difficulties, as a
endocrine tonic and as an ‘adaptogen’, have diuretic properties it is used in the form of cooling drink [19-21].

**Centella asiatica in Food and Beverage**

*Centella* is commonly eaten fresh as vegetable (ulam and salad) [22]. The salads are eaten together with the main meal and can act as an appetizer. Beside eaten raw, it can be cooked as a part of a soup or as a main vegetable. Since the *Centella* is very popular as a vegetable, it is available everywhere in the wet markets and supermarkets. As a vegetable and therapeutic use, the whole plant including leaves, stem and root are consumed [23]. It is used as health tonic and processed into cordial drinks and ready to drink juice [24]. The fresh plants are also blended to make drink and juice. The fresh prepared juice is popular in markets and supermarkets. As a vegetable and therapeutic use, the whole plant including leaves, stem and root are consumed [23]. It is used as health tonic and processed into cordial drinks and ready to drink juice [24]. The fresh plants are also blended to make drink and juice. The fresh prepared juice is popular and ready to drink juice [24]. The fresh plants are also blended to make drink and juice. The fresh prepared juice is popular and ready to drink juice [24]. The fresh plants are also blended to make drink and juice. The fresh prepared juice is popular and ready to drink juice [24]. The fresh plants are also blended to make drink and juic...
Memory enhancing activity

Aqueous extract of C. asiatica showed significant effect on learning and memory enhancing and significantly decreased the levels of nor epineprine, dopamine and 5-HT and their metabolites in the brain [28]. Treatment during postnatal developmental stage with C. asiatica aqueous extract influenced the neuronal morphology and promoted the higher brain function of juvenile and young adult mice. Centella asiatica contains brahmacid, isobrahm acid, brahminoside and brahmoxide that enhance memory activity.

Skin protective activity

Skin aging appears to be principally related to a decrease in the levels of type I collagen, the primary component of the skin dermis. Asiaticoside, a saponin component isolated from Centella asiatica, has been shown to induce type I collagen synthesis in human dermal fibroblast cells [29].

Wound healing effect

Total triterpenoid fraction extracted from C. asiatica increased the percentage of collagen in cell layer fibronectin and thus may help in promoting wound healing [33]. Increased cellular proliferation and collagen synthesis, angiogenesis and epithelization at wound site is brought about by madecassol. Madecassol, an extract of this plant containing madecassic acid, asiatic acid and asiaticoside accelerates cicatrisation and grafting of wounds. Asiaticoside, one of the active constituent of C. asiatica induces antioxidant activity at the initial stage thus playing important role in wound healing [32].

Anticancer

Preclinical studies have shown that methanolic extract of C. asiatica causes inhibition in breast cancer cells by inducing apoptosis in different cancer cell lines HeLa, HepG2 and SW48 and MCF-7. Out of which MCF-7 found to be most sensitive line for in vitro growth inhibitory activity which is marked by decrease in cell viability that is concentration dependent based on MTT assay [34]. Upon oral administration of C. asiatica (500 mg/kg or 1000 mg/kg) exhibits significant decrease in the level of tumor incidence, weight, cumulative number of papilloma in comparison to carcinogen control group [30].

Mental retardation

Centella asiatica tablets administered orally to mentally retarded children showed significant increase in general ability and behavior patterns [31].

Use in pregnancy and lactation

Gotukola has been traditionally used in Bengal as a contraceptive agent. Antifertility activity was demonstrated in vivo in an early study of C. asiatica. Gotukola was tested for ant zygotic, anti-implantation and early abortifacient activity [35].

Safety in children

Dried herb has been assessed in a clinical trial in India as a mental tonic for mentally disabled children [35].

Safety

Scientists who studied the topical effects of the herb and its active constituents (asiaticoside, asiatic acid and madecassic acid) on guinea pigs, reported that all the materials studied are very weak irritants [36]. Centella asiatica has been shown to be safe and effective in children [37].

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Acknowledgement

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Conclusion

Centella asiatica has been in use since times immemorial to treat wide range of indications. The dynamic nature of indigenous knowledge has led to its survival through centuries. The use of this knowledge is necessary as it is not only socially desirable but is economically affordable, sustainable and involves minimum risks and procedures. The herb is widely available and very cost effective. Centella asiatica is a very important herbal plant in food and beverages. Its potential as a natural antioxidant extract reflects its capability to become a candidate to prevent oxidative damage, hence promoting health benefits.

References


