



# The medicinal uses of *Callicarpa* L. in traditional Chinese medicine: An ethnopharmacological, phytochemical and pharmacological review

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## ARTICLE INFO

### Article history:

Received 26 August 2012

Received in revised form

27 December 2012

Accepted 30 December 2012

Available online 9 January 2013

### Keywords:

*Callicarpa* L.

Traditional Chinese medicine

Terpenoids

Flavonoids

Hemostatic

Anti-inflammatory

Analgesic activity

Rheumatism

## ABSTRACT

**Ethnopharmacological relevance:** *Callicarpa* L. (Verbenaceae) has been used for centuries in Traditional Chinese Medicine (TCM) for the prevention and treatment of a wide number of health disorders such as inflammation, rheumatism, hematuria, fracture, hematemesis, menoxenia, gastrointestinal bleeding, scrofula, etc.

**Aims of the review:** To assess the scientific evidence for therapeutic *Callicarpa* in TCM and to identify future research needs.

**Methods:** The available information on the ethnopharmacological uses in Chinese medicine, phytochemistry, pharmacology and clinical practice of *Callicarpa* species was collected via a library and electronic search (PubMed, ScienceDirect, Google Scholar and CNKI).

**Results:** A variety of ethnomedical use of *Callicarpa* has been recorded in many ancient Chinese books. Phytochemical investigation of this genus has resulted in identification of more than 200 chemical constituents, among which diterpenes, triterpenoids and flavonoids are the predominant groups. The isolates and crude extract have exhibited a wide spectrum of *in vitro* and *in vivo* pharmacological effects involving anti-inflammatory, hemostatic, neuroprotective, anti-amnesic, antitubercular, antioxidant, antimicrobial and analgesic activities. Preparations containing *Callicarpa* species exerted good efficacy on clinical applications of gynecological inflammation, internal and external hemorrhage as well as acne vulgaris and chronic pharyngitis, etc. From the toxicity perspective, only three *Callicarpa* species have been assessed.

**Conclusions:** Pharmacological results have validated the use of *Callicarpa* species in the traditional medicine. As literature demonstrated, terpenoids and flavonoids are perhaps responsible for most of the activities shown by the plants of this genus. However, the detailed active compounds and the underlying mechanisms remain a work in progress. In addition, more attention should be paid to *C. nudiflora* as well as the domain of rheumatism.

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## 1. Introduction

*Callicarpa* L. (*beautyberry*) is a genus of about 140 species of herbaceous plants, which belongs to the Verbenaceae family. Plants of this genus have been widely used in indigenous medicine for thousands of years in the treatment of inflammation, rheumatism, hematuria, hematemesis, fractures, women amenorrhea, gastrointestinal bleeding, scrofula, etc. (Jones and Kinghorn, 2008). TCM has accumulated valuable information for the usages of *Callicarpa*, which has been recorded and summarized in ancient manuscripts and in recently published books, such as A Supplement to Materia Medica ("Ben Cao Shi Yi", 本草拾遺), Textual

Research on Reality and Titles of Plants ("Zhi Wu Ming Shi Tu Kao", 植物名实图考), Compendium of Materia Medica ("Ben Cao Gang Mu", 本草綱目), Chinese Pharmacopoeias and "Zhong Hua Ben Cao"(中华本草). Modern pharmacological researches have confirmed that the isolated compounds or extracts of *Callicarpa* displayed anti-inflammatory, hemostatic, neuroprotective, anti-amnesic, antitubercular, antioxidant, antimicrobial as well as analgesic effects, which correlates with the records of activating blood, promoting Qi circulation, relieving swelling, easing pain as well as correcting menstrual disorder and alleviating anemofrigid cold in ancient Chinese works.

In the last decade, the use of *Callicarpa* species in TCM has led to a rapid increase of the information available on the active components of *Callicarpa*. More than 200 chemical constituents have been isolated or identified from *Callicarpa* species, among which terpenoids (diterpenes and triterpenoids) and flavonoids

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**Table 1***Callicarpa* species used in Traditional Chinese Medicine (TCM).

Species	Parts used	Traditional use	Usage	Reference
<i>C. formosana</i>	Leaf	(a)Used to scrofula and goite (b)Used to thrombocytopenic purpura	Decoct <i>Callicarpae Formosanae Radix</i> (60 g) and <i>Platycodonis Radix</i> (15 g) Decoct <i>Callicarpae Formosanae Folium</i> (15 g), <i>Galii Aparines Herba</i> (15 g), <i>Cervi Cornu Pantotrichum</i> (15 g), <i>Gardeniae Radix</i> and <i>Melastomae dodecandri Radix</i> (30 g, both)	“Zhong Hua Ben Cao” 中华本草, (Editorial Board of Zhong Hua Ben Cao, 1999)
<i>C. dichotoma</i>	Leaf	(c)Used to acute conjunctivitis (a)Used to hemoptysis, nosebleed, hemafecia, functional uterine bleeding (b)Used to bleeding after tooth extraction, traumatic bleeding, surgical bleeding	Decoct <i>Callicarpae Formosanae Herba</i> Decoct <i>Callicarpae Dichotomae Folium</i> (3–9 g)  Decoct <i>Callicarpae Dichotomae Folium</i> (50 g) and coated the wound with powder simultaneously	“Zhong Cao Yao Da Dian” 中草药大典, (Chen and Lin, 2006)
<i>C. kwangtungensis</i>	Twig, leaf	(a)Used to measles (b)Used to migraine	Decoct <i>Callicarpae Caulis</i> (10 g), <i>Astilbe rivularis rhizoma</i> (6 g) and <i>Caesalpiniae Decapetalae Semen</i> (6 g) Decoct <i>Callicarpae Herba</i> (22 g) (added <i>Ligustri Lucidi Fructus</i> if headache skew to left and <i>Citri Reticulatae Pericarpium</i> if right)	“Hu Nan Yao Wu Zhi” 湖南药物志, (Hunan Institute of Traditional Chinese Medicine, 1972)
<i>C. macrophylla</i>	Leaf	(c)Used to stomachache (a)Used to gastrointestinal bleeding (b)Used to rheumatism (c)Used to metrorrhagia	Decoct <i>Callicarpae macrophyllae Folium</i> (20 g) and <i>Salviae Cavaleriei Herba</i> (20 g) Decoct <i>Callicarpae macrophyllae Folium</i> (15 g), <i>Cocculi Orbiculati Rhizoma</i> (15 g) and <i>Periplocae forrestii Radix</i> (15 g) Decoct <i>Callicarpae macrophyllae Folium</i> (20 g) and <i>Hemisteptae Lyratae Herba</i> (20 g)	“Xin Bian Zhong Cao Yao Tu Pu Ji Chan Yong Pei Fang” 新编中草药图谱及常用配方, (Yang and Xia, 2010)
<i>C. cathayana</i>	Leaf	(a)Used to internal bleeding (b)Used to external hemorrhage (c)Used to furuncle and carbuncle	Take 10 g powder of <i>Callicarpae Cathayanae Folium</i> with warm water for three times every 4 h Grind dried <i>Callicarpae Cathayanae Folium</i> into powder and then coat it to the wound Decoct <i>Callicarpae Cathayanae Folium</i> (3–6 g) and coat the mashed fresh leaves to affected part simultaneously	“Zhe Jiang Min Jian Chang Yong Cao Yao” 浙江民间常用草药, (Zhe Jiang Health Bureau, 1970)
<i>C. nudiflora</i>	Leaf	(a)Used to gastrointestinal bleeding, tuberculosis hemoptysis (b)Used to thrombocytopenic bleeding (c)Used to upper respiratory tract infection, tonsillitis, pneumonia, bronchitis	Take 6 g powder of <i>Callicarpae Nudiflorae Folium</i> and <i>Bletillae Rhizoma</i> (1:1) three times a day  Decoct <i>Callicarpae Nudiflorae Folium</i> (60 g) and <i>Platycladi Cacumen</i> (60 g). Decoct <i>Callicarpae Nudiflorae Folium</i> (15 g), <i>Ardisiae Folium</i> (15 g) and <i>Fraxini Cortex</i> (9 g)	“Hai Nan Chang Yong Zhong Cao Yao Ming Lu” 海南常用中草药名录, (Deng, 2006)
<i>C. rubella</i>	Twig, leaf, root	(a)Used to swollen boils and fracture (b)Used to hematemesi (c)Used to irregular menstruation (d)Used to rheumatic fever, paralysis	Mash fresh <i>Callicarpae Rubellae Folium</i> to external apply  Decoct <i>Callicarpae Rubellae Folium</i> and <i>Platycladi Cacumen</i> at ratio of 1:2 Decoct <i>Callicarpae Rubellae Radix</i> for oral  Decoct <i>Callicarpae Rubellae Radix</i> (15 g) and <i>Artemisiae Anomala Herba</i> (15 g).	“Xin Bian Zhong Cao Yao Tu Pu Ji Chang Yong Pei Fang” 新编中草药图谱及常用配方, (Yang and Xia, 2010)
<i>C. giraldii</i>	Leaf	(a)Used to hematemesi (b)Used to hematuria	Grind 3 g dried <i>Callicarpae Giraldii Folium</i> with boiled water every time Decoct <i>Callicarpae Giraldii Folium</i> (20 g), <i>Imperatae Rhizoma</i> (20 g), <i>Glechomae Longitubae Herba</i> (20 g) and <i>Potamogeton Distincti Folium</i> (15 g)	“Xin Bian Zhong Cao Yao Tu Pu Ji Chang Yong Pei Fang” 新编中草药图谱及常用配方, (Yang and Xia, 2010)
<i>C. yunnanensis</i>	Root, leaf	Used to uterine bleeding, hemafecia, traumatic bleeding	Decoct roots of <i>C. yunnanensis</i> (15–30 g) for internal application and powder for external application	“Zhong Hua Ben Cao” 中华本草, 1999
<i>C. arborea</i>	Root, leaf	Similar use as <i>C. yunnanensis</i>	Similar usage as <i>C. yunnanensis</i>	“Zhong Hua Ben Cao” 中华本草, 1999
<i>C. kochiana</i>	Root, twig, leaf	(a)Used to rheumatism (b)Used to cold headache (c)Used to treat edema	Decoct <i>Callicarpae Kochianae Radix</i> (60–90 g) Decoct fresh <i>Callicarpae Kochianae Folium</i> (30 g) plus wine Decoct fresh <i>Callicarpae Kochianae Radix et Folium</i> (30–60 g)	“Zhong Hua Ben Cao” 中华本草, 1999
<i>C. bodinieri</i>	Root, stem, leaf	(a)Used to hematemesi (b)Used to hematuria (c)Used to bruises and traumatic bleeding	Decoct <i>Callicarpae Bodinieri Folium</i> (30 g) Decoct <i>Callicarpae Bodinieri Folium et Radix</i> (30 g) and <i>Pyrrosiae Folium</i> (30 g) Mash fresh <i>Callicarpae Bodinieri Folium</i> to topical wound	“Xin Bian Zhong Cao Yao Tu Pu Ji Chang Yong Pei Fang” 新编中草药图谱及常用配方, (Yang and Xia, 2010)
<i>C. longissima</i>	Twig, leaf	(a)Used to puerperal rheumatism (b)Used to cough (c)Used to gastrorrhagia (d)Used to bruises	Take the half glass cup of warm fresh juice of <i>Callicarpae Longissimae Folium</i> and rice wine plus 5 drops of Ginger Decoct 25 g fresh <i>Callicarpae Longissimae Folium</i> (hairs removed) plus 15 g crystal sugar Take half glass cup of fresh juice of <i>Callicarpae Longissimae Folium</i> with honey Grind fresh <i>Callicarpae Longissimae Folium</i> added rice wine and then coat to the wound	“Fu Jian Zhong Cao Yao” 福建中草药, (Fujian Institute of Medicine, 1970)
<i>C. integerrima</i>	Leaf	Used to rheumatism, osteodynia, oxyhepatitis	Decoct <i>Callicarpae Integerrimae Folium</i> for oral	“Guang Xi Yao Yong Zhi Wu Ming Lu” 广西药用植物名录, (Fang et al., 1986)
<i>C. loboapiculata</i>	Leaf	Used to pruritus, desquamation, ulcerate, scabies	Decoct <i>Callicarpae Loboapiculatae Folium</i> for washing affected parts	“Zhong Guo Yao Hai” 中国药海, (Ran, 1993)

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