PHYTOCHEMICAL AND THERAPEUTIC USE OF BACCHARIS LATIFOLIA (RUIZ & PAV.) PERS. (ASTERACEAE)

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Abstract

Baccharis latifolia is a plant commonly known in South America as “Chilca”. B. latifolia has several curative properties reported in traditional medicinal such as analgesic, treat diarrhea, vulnerary, resolvent, flatulence, heartburn, antidiabetic and in the treatment of inflammation, stomach pain and insomnia. The medicinal properties of this plant represent a valuable source of medicinal compounds. This study is collective information concerning the taxonomy, ethnobotany, phytochemistry, toxicity and biological activities of the B. latifolia.

Keywords: Baccharis latifolia, ethnobotany, phytochemistry, medicinal plant
Introduction

*Baccharis latifolia*, commonly known as “Chilca”, is a native plant of South America and widely distributed in the Andean region extending from Merida (Venezuela) to Tucuman (Argentina). Including Colombia, growing in the tropics, with temperatures between temperate and cold temperate [1].

Taxonomy


Traditional use

*B. latifolia* has been widely used by native peoples of Latin America for medicinal purposes. The leaves are used to relieve diarrhea when they are prepared as an infusion. The leaves in the form of plaster are applied to bone fractures to reduce inflammation and also are applied as a poultice to calm rheumatic pains [2]. Infusions at doses of 5% acts as a tonic, anti-diabetic and euphoretic being widely recommended for liver disease [3].

The decoction of flowers and leaves is traditionally used to soothe coughs and bronchitis; as an ointment when mixed with animal fat for wounds disinfection [4]; It also has an emollient effect when is used in steam baths [5]. Furthermore, the decoction has an aphrodisiac effect and antidepressant [6]; with elimination of insomnia [7]; it is used to treat rheumatism, liver diseases, wounds and ulcers [8].

The Colombia Handbook of Medicinal Plants recognizes biological activities of the plant as: antidiarrheal, vulnerary, anti-flatulent, anti-diabetic and anti-inflammation, stomach pain and insomnia [9]. The decoction is used for treating rheumatism, hepatic disorders, cough, bronchitis, ulcers and in case of intestinal parasites. The plant is used externally as a poultice for cases of sprains, wounds, rheumatic pain and bruising [10].

In Peru, *B. latifolia* is used as traditional medicine for people of the Province of Canta. The decoction of leaves and bark are used against the head aches and muscle pain, and as anti-scarring. The tradition says that should be given a massage on the pain part with fresh leaves. The leaves are also boiled in a liter of water and when the water cools can be used to wash wounds body parts [11].

In Bolivia the main use of *B. latifolia* is as an anti-inflammatoty, typically utilized in therapeutic treatments performed by physiotherapists and chiropractors; the leaves are mashed and pulverized and then heated with urine to form a cataplasm to cure contusions, luxations, and sprains [12, 13]. The infusion of the leaves is used to treat diarrhea, vulnerary, flatulence, heartburn, anti-diabetic and in the treatment of inflammation, stomach pain and insomnia [9].

Phytochemistry

*B. latifolia* contains in leaves: resin, oxidases, baccharin, turpentine, gallic tannins, quercetin, rutin, germacrene derivatives, diterpene, clerodanoids, labdanos, eudesmane, limonene, β-cubebeeno, d-germacrene, δ-cadinene, epi-α-bisabolol, dihydroisochromolaenin, ledol, friedelin and dimethoxyflavone [3, 14-18]. *B. latifolia* in Colombia’s Handbook on medicinal plants reported gallo-tannins, essential oil, leucoanthocyanind, phenolic compounds, alkaloids, coumarins, steroids and triterpenes as friedelin, sesquiterpene lactones and flavonoids such as quercetin, and rutin [10].

In a study conducted in Ecuador to obtain the essential oils from the aerial parts of *B. latifolia* was carried out by hydrodistillation and analyzed by gas chromatography/mass spectrometry (GC/MS) and flame ionization detector (GC/FID). Twenty-nine compounds were identified and the main constituents of the essential oil were limonene (33.72%), b-hellandrene (10.32%), sabinen (10.28%), β-pinene (6.99%) and α-pinene (5.44%) [19].

The phytochemical characterization of ethanol extracts of *B. latifolia* from Bolivia were sterol, terpenes, flavonoids and saponins [20]. The compounds found in the leaves were gallotannins, leucoanthocyanids, phenolic compounds, alkaloids, coumarins, steroids, triterpenes, sesquiterpene lactones, flavonoids [9] and essential oil for instance limonene as the main monoterpenes found, b-cubebene, germacrene D, and d-cadinene. Several monoxygenated sesquiterpenes were identified such as verbocetalol, epi-a-bisabolol, and dihydroisochromolaenin [18].

Medical properties

The essential oils obtained from *B. latifolia* have shown interesting antimicrobial activity against bacterium *Staphylococcus aureus* [22] and also good activity against the fungi *Trichophyton rubrum* and *Trichophyton mentagrophytes* with an MIC of 31.25 and 62.5 μg/mL respectively and moderate activity against *Aspergillus fumigatus* (MIC=157.4 ug/ml)
They were inactive against the Gram-negative bacteria *P. aeruginosa*, *K. pneumoniae*, *P. vulgaris*, *E. coli*, *S. typhimurium*, and Gram-positive bacteria *E. faecalis* and *S. aureus* [19].

The methanol extract from leaves of *B. latifolia* inhibits the production of reactive oxygen species (ROS) in vitro and in vivo [23, 24] usually in the form of infusions or poultices as described in the medicinal plant Colombian Vademécun [10].

The ethanol extracts of *B. latifolia* has *anti-proliferative properties* on cell Cac0-2 [20]. The dichloromethane extract provides anti-inflammatory activity at doses of 300 mg/kg when using mouse ear edema inhibition model [26].

The hexane and dichloromethane extracts of *B. latifolia* exhibited inhibitory activity on COX-1 with higher percentages than those presented by the reference drug indomethacin (100%), with significant effect on LTC4-release. The inhibitory effect on COX-2 was evident with the hexane, dichloromethane and aqueous extracts in 98.8, 100 and 98.1%, respectively and similar to those of the reference drug (23). The methanol extract of *B. latifolia* had an inhibitory effect of 55% on oxygen reactive species in the production of human neutrophils stimulated with phorbol-12-myristate-13-acetate (PMA) [21].

The ethanol extract of *B. latifolia* show a significant antiproliferative activity against cell lines of Hep3B, HepG2, PLC PFR 5, SNU-182 and primary human hepatocyte test with an IC$_{50}$ of 10.8 ± 4.6, 33.3 ± 3.4, 24.3 ± 24.3, 20.1 ± 2.2 mg/mL, respectively [27]. The acetone extract (200 mg/mL) have a percent inhibition of 82 ± 3 and 89 ± 2 against cancer cell lines of skin and tongue [28].

**Toxicity**

The use of *B. latifolia* is toxic in high doses [3]. The Colombian Handbook on medicinal plants stated no contraindications to the use of *B. latifolia*. The acute toxicity studies conducted in the Department of Pharmacy, National University of Colombia revealed a slight depression and loose stools. No significant changes are seen in weight gain or loss or pathological changes in animals that were given the extract. The subacute oral toxicity study in rats showed no mortality, but changes in the relative weight of organs such as the spleen and kidneys, and the renal tissue injury suggesting a slight toxic response [10].

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**References**