

Phytochemical study and Biological effects of *Anredera cordifolia*: A short review

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Abstract

Anredera cordifolia is called binahong and it is widely planted as an ornamental and medicinal plant in Indonesia. On the other hand, in some other countries this plant is classified as a noxious weed. It is used for traditional medicines to treat diabetes, relieve shortness of breath, stabilize blood pressure, coughing and vomiting blood, lung disease, accelerate wound healing process, restoring bruised, headache, hives, immune system, nose bleeding, prevent strokes and health problems after the surgery and childbirth. It contains several active compounds, such as saponins, alkaloids, polyphenols, flavonoids, and glycosides that have an effect on the wound healing process. Its pharmacological properties have been widely investigated and acknowledged, especially with regard to its antibacterial activity, which improves the healing of wounds infected by *Staphylococcus aureus*, and to its antifungal activity against *Candida albicans*.

Keywords: *Anredera cordifolia*, chemical compounds, plants, bioactivities.

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*Article History:

Received: 12/07/2021

Revised: 28/07/2021

Accepted: 28/07/2021

DOI: <https://doi.org/10.7439/ijbar.v12i7.5647>

QR Code



How to cite: Rashed K. Phytochemical study and Biological effects of *Anredera cordifolia*: A short review. *International Journal of Biomedical and Advance Research* 2021; 12(07): e5647. Doi: 10.7439/ijbar.v12i6.5647 Available from: <https://ssjournals.com/index.php/ijbar/article/view/5647>

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1. Introduction

Plants have been an important source in drug discovery. The medicinal values of plants lie in their phytochemicals, which makes specific physiological actions on the human body. The traditional medicine approaches to the prevention and diagnosis of diseases, improvement of physical and mental functions, and maintenance of health also include medicinal plants [1]. *Anredera cordifolia* is belonging to the family Basellaceae. It is a very fast-growing plant which produces very long stems, up to 6 meters in length, as reproductive organs [2]. It also produces a mass of tubers as reproductive parts which are also a carbohydrate source that enables the plant to survive through difficult periods [3]. In Indonesia, It is recognized under the local name binahong, a famous folk medicinal plant, known especially for healing wounds and several diseases. The Encyclopedia of Traditional Chinese Medicines informs that *A. cordifolia* can be used to treat fractures, knocks, falls and weakness during convalescence;

to disperse swelling and to dissipate stasis; as a supplement for kidney disease; to strengthen the lumbus and for relief of soreness in the lumbus and the knees [4]. The plant has also been used to treat diabetes, hepatitis and cardiovascular problems [5]. Some references also reported that the plant has other biological properties as an antioxidant [6], antihyperlipidemic agent, endothelial fat content reducer [7] and an antihyperuricemic agent [8]. This review contained the previous phytoconstituents and pharmacological reports on the plant.

2. Phytochemicals

A new triterpenoid sapogenin, elucidated as ethyl 3 β -hydroxy-30-noroleana-12, 18-dien-29-oate, from *Boussingaultia gracilis* (*A. cordifolia* synonym). Their study also describes the isolation of another five sapogenins: larreagenin A, 3 β -hydroxy-30-noroleana-12, 19-dien-28-oic acid and its ethyl ester, ursolic acid, 28-ethyl

hydrogen 3 β -hydroxyolean-12-ene-28, 29-dioate [9]. Other compounds isolated from *A. cordifolia* leaf extracts include 3,5,3',4'-tetrahydroxyflavone [10] and the flavonoid 8-glucopyranosyl-4',5,7-trihydroxyflavone (vitexin) [11]. Vitexin exhibited antioxidant activity when tested with the 2,2-diphenyl-1-picrylhydrazyl (DPPH) method [11], and demonstrated *in vitro* α -glucosidase inhibitory activity and antidiabetic activity in alloxan-induced mice [11]. A new method for the extraction of this compound from *A. cordifolia* leaves, with a non-toxic and environmentally friendly solvent, was proposed [12]. Myricetin and morin were detected by high-performance liquid chromatography (HPLC), whereas kaempferol and quercetin were not found in *A. cordifolia* leaves extracts. The concentrations of polyphenols, flavonoids, and flavonols were determined by spectrophotometric methods, but anthocyanidins were not detected [13]. The volatile constituents of the aerial parts were analyzed and the major compounds were phytol (15.33 %), α -pinene (9.0 %), and 6, 10, 14-trimethyl pentadecanone (6.12 %). In this work vitexin and isovitexin were also isolated [14]. The essential oil was analyzed by GC and GC-MS and 19 compounds were identified. Hydrocarbons were the main constituents (67.7 %) (14). Lupeol and β -sitosterol, and ursolic acid [15] were detected by thin-layer chromatography (TLC). Using TLC as a support, UV-VIS, and FTIR spectrophotometry, it was concluded that ethanolic extracts of leaves might contain p-coumaric acid. The presence of saponins was verified by general detection tests (foam formation), using TLC, and also by the analytical method [16].

3. Biological activities

Several studies have shown promising results against microorganisms [17]. The ethanolic extract obtained from the stem demonstrated antifungal activity against *Candida albicans* [18]. The infusion of *A. cordifolia* leaves at high concentrations inhibited the growth of *Porphyromonas gingivalis* and *Prevotella intermedia* [19]. The n-hexane, ethyl acetate and ethanolic extracts of *A. cordifolia* leaves showed activity against *Mycobacterium tuberculosis* strains, and the hexane extract showed better activity [20]. Aqueous and chloroform extracts obtained from the roots inhibited the growth of several bacteria, including *Staphylococcus* and *Pseudomonas*, in a screening in Africa in which six medicinal species were tested [21]. The growth of *Streptococcus mutans* was inhibited by ethanolic extract of leaves. *Bacillus cereus*, *Salmonella enteritidis* [22], *Escherichia coli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Bacillus subtilis*, also had their growth inhibited by aqueous leaf extracts of the plant. On the other hand, the methanolic extract prepared from *A. cordifolia* leaves did not inhibit the growth of

Staphylococcus aureus, *Enterococcus faecalis*, *Escherichia coli*, and *Pseudomonas aeruginosa* [23]. Besides the antimicrobial activity of *A. cordifolia*, the literature describes a considerable number of pharmacological studies on this species. Promising effects of leaf extracts have been described against cervical cancer [24], and reduction of a tumor necrosis factor and other inflammatory mediators in macrophage lines [25]. Ethanolic leaf extract of *A. cordifolia* and *Centella asiatica* L. exhibited anti-inflammatory activity in human red blood cells in a membrane stabilization assay [26]. Leaf extract microemulsion at 0.5 % also demonstrated antiaging effects [27].

4. Conclusion

This modern review proved the main uses, as well as the medicinal and nutritional properties, of *A. cordifolia*. *A. cordifolia* is a promising medicinal plant, as several pharmacological assays corroborate its efficacy, especially its antimicrobial activity.

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