



THE MEDICINAL USES OF *CALOTROPIS GIGANTEA* – A REVIEW

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ABSTRACT

Traditional system of medicine consists of large number of plants with various medicinal and pharmacological importance's and hence represents a priceless tank of new bioactive molecules. This review will be helpful to create interest towards *Calotropis gigantean* and may be useful in developing new formulations with more therapeutic and economical value.

Keywords: *Calotropis gigantean*, Medicinal and Pharmacological Importance.

INTRODUCTION

Asthma is characterized by bronchoconstriction and inflammation, with infiltration and activation of inflammatory cells such as eosinophils and mast cells, and subsequent release of inflammatory mediators. Much of the therapy directed at the treatment of asthma is either to provide symptomatic relief through bronchodilation or to reduce inflammation to prevent or delay airway remodelling. The current drug therapy is only symptomatic and do not limit disease progress. Additionally, besides the high cost, the prolonged use of many of these drugs is associated with severe adverse reactions and toxicity. As a result, alternative treatments based on natural plant products and herbal mixtures in the form of polyherbal formulations are becoming increasingly popular in the India, US and other countries. In India, the ancient literatures like 'Charak Samhita' and 'Sushruta Samhita' describe use of plants and polyherbal formulations for health care [1]. The trend in pharmaceutical research is moving away from single molecule or single target approach to combinations and multiple target approaches [2]. There is growing evidence to show that medicinal plants contain synergistic and/or side-effects neutralizing combinations [3]. Considering this fact, we aimed for screening the action of medicinal plant, *Calotropis gigantean*.

Among several respiratory diseases affecting man, bronchial asthma is the most common disabling syndrome. Nearly 7–10% of the world population suffers from bronchial asthma. Asthma is characterized by various airway obstruction, airway eosinophilic inflammation and bronchial hyper responsiveness [4] and is a global health problem that results from a complex interplay between genetic and environmental factors [5]. Despite the availability of a wide range of drugs, the relief offered by them is mainly symptomatic and short lived. Moreover, the

side effects of these drugs are instigates scientists to identify effective and safe remedies to treat bronchial asthma [6].

Herbal medicines

Herbal medicines are being used by nearly about 80% of the world's population, largely in developing countries for primary health care [7]. Assessing the current status of health care system in adequacies of synthetic drugs is likely to be more glaring in the coming years. It has been reported that there has been an alarming increase in number of diseases and disorders caused by synthetic drugs, prompting a switch over to traditional herbal medicines [8]. Alternative system of medicine is a major component of health care globally and many healthcare providers and organizations are being forced to consider integrating them into their practice and treatment guideline [9]. From time immemorial, man depends on plants as medicine. From a historical perspective, it is evident that the fascination for plants is also as old as mankind itself. The plant kingdom represents a rich storehouse of organic compounds, many of which have been used for medicinal purposes and could serve as lead for the development of novel agents having good efficacy in various pathological disorders in the coming years. Conventional antiasthmatic compounds such as sodium cromolyn and sodium cromoglycate is one of the examples of the lead prepared from the analogs of the naturally occurring furanochromone khellin (visammin), found in *Ammi visnaga* Lam [10]. Explanation of the chemical constituents of the plants and pharmacological screening will thus provide us the basis for developing new life saving drugs. Herbs have always been the principal form of medicine in India and presently they are becoming popular throughout the world, as people strive to stay healthy in the face of chronic stress and pollution, and to treat illness with medicines that work in

count with the body's own defense [11]. There is a widespread belief that green medicines are healthier and more harmless or safer than synthetic ones. Ayurveda is a traditional Indian Medicinal System practiced for thousands of years. Considerable research on Pharmacognosy, chemistry, pharmacology and clinical therapeutics has been carried out on medicinal plants. Natural products, including plants, animals and minerals have been the basis of treatment of human diseases. The current accepted modern medicine has gradually developed over the years by scientific and observational efforts of scientists. However, the basis of its development remains rooted in traditional medicine and therapies [12].

The *Calotropis gigantea* is native to Indonesia, Malaysia, Philippines, Thailand, Sri Lanka, India and China. It is a common wasteland weed [13]. *Calotropis* belongs to Asclepiadaceae or Milkweed or Ak family which includes 280 genera and 2,000 species of worldwide distribution but most abundant in the subtropics and tropics, and rare in cold countries

The *Calotropis gigantea* is a perennial shrub, growing up to 2.5 meters with branches and sub branches. It is a slow growing variety of *Calotropis*. Leaves are simple, opposite and sessile ovate and cordate at base. *Calotropis gigantea* contains latex in almost all parts of the plant. Flowers are beautiful, white in color, in umbellate lateral cymes. Fruits are fleshy follicles, green; seeds attached with abundant white coma.

Calotropis gigantea grows up to 4 m in height and possesses sessile leaves. The leaves are about 10 cm in length and are about 8 cm in width. Its flowers are 14-15 mm long and 3-4.5 cm in diameter.

The latex of *Calotropis gigantea* contains Cardiac glycosides, calotropin, uscharin, calotoxin and giantin. The resinol portion consists mainly of two new alcohols, α and β -calotropeols in almost equal quantities and minor amounts of β -amyrin. Also mixture of tetracyclic triterpene, fatty acids, Flavonoids, Alkaloids, Proteolytic enzyme calotropain, traces of sterols etc

Habib MR *et al.*, (2007) have isolated two compounds and from petroleum ether fraction of methanol extract of *Calotropis gigantea* root bark and the structures were determined as stigmasterol and beta-sitosterol [14].

Sucharita Sen *et al.*, (1992) have isolated a new flavonol trisaccharide, Isorhamnetin rutinoside, Isorhamnetin-3-O-glucopyranoside and Taraxasteryl acetate from the aerial parts of *C. gigantea*

A new pregnanone, named calotropone, was isolated from the ethanolic extract of the roots of *C. gigantea* together with a known Cardiac glycosides [16].

Kitagawa *et al.*, has isolated the new oxiopregnane - oligoglycosides named *Calotropis A* and *B* from the roots of *C. gigantea* and their chemical structure has been elucidated by chemical and spectroscopy methods

Wang Maoyuan *et al.*, (2008) have isolated one cardenolid aglycone and its glycoside, coroglaucigenin and frugoside from the root of *Calotropis gigantea*. The structures were elucidated on the basis of spectroscopic methods. Cytotoxic activities of the two compounds were evaluated, both of them exhibited significant cytotoxic

activity against K562 and SGC-7901 cell lines with IC50 values of 3.4 and 14.1 $\mu\text{g}/\text{ml}$ [17].

The presence of a deoxysugar at C-3 was crucial for cytotoxic activity Gaurav Lodhi *et al.*, (2009) has reported the stem extract of *C. gigantea* has a significant effect on liver injury as well as on oxidative stress, resulting in reduced lipid peroxidation and improved serum biochemical parameters such as AST and ALT. The reduced levels of SOD, CAT, GSH and GPx in CCl_4 treated rats were significantly increased by treatment with *C. gigantea* extract [18].

Pathak AK *et al.*, (2007) reported the alcoholic extracts of *C. gigantea* flower produced a significant decrease in the number of writhing and paw licking time. In the hot plate method a significant activity was observed after 30 min of dosing. The results seem to confirm the traditional use of the plant as a potential analgesic [19].

Deshmukh PT *et al.*, (2009) reported the ethanolic extract of root bark of *C. gigantea* has shown significant wound healing activity in rats by excision, incision and dead space wound healing models [20].

Rajesh R *et al.*, (2005) reported the latex of *C. gigantea* has shown medicinal properties and main applications are in controlling bleeding and exhibited strong proteolytic activity. The crude extract hydrolyses casein, human fibrinogen and crude fibrin clot in a dose dependent manner [21].

Shrivastava SR *et al.*, (2007) reported the *C. gigantea* root has shown promising contraceptive properties in colony-bred rat model [22].

Havagiray R *et al.*, (2004) reported the anti-diarrhoeal effect of hydroalcoholic (50:50) extract of aerial part of *C. gigantea* was studied against castor oil-induced-diarrhoea model in rats [23].

Mahatma OP *et al.*, (2010) reported the chloroform, n-butanol, ethanol and distilled water extracts of leaves of *Calotropis gigantea* (Linn.) was screened for anti-inflammatory and antipyretic activity. Anti-inflammatory was compared with the standard drug Paracetamol for carrageenan induced rat paw oedema method. They also compared the Antipyretic activity with the standard drug Paracetamol in yeast induced pyrexia in albino rats [24].

Sheela B *et al.*, (2010) reported the latex of *Calotropis gigantea* is a rich source of useful components that has medicinal properties and one of the main applications is in controlling the heart muscle. The crude latex extract contained many proteins, which are highly basic in nature and exhibited strong dilatation activity. The latex damage the contractility of the cardiac muscle thus the present study reveals that the latex produces vasodilatation effect at fixed dose concentration [25].

Ameeta Argal *et al.*, has reported the CNS activity of alcoholic extract of peeled roots of *calotropis gigantea* R.Br. (Asclepiadaceae) was tested orally in albino rats at the dose level of 250 and 500 mg/kg body wt. Prominent analgesic activity was observed in Eddy's hot plate method and acetic acid induced writhings. The significant anticonvulsant activity was observed. The extract treated

rats spent more time in the open arm of EPM showing its antianxiety activity.

Chitme et al has reported the antipyretic activity of hydro-alcoholic (50:50) root extract of *Calotropis gigantea* by using yeast-induced and TAB (Typhoid) vaccine-induced pyrexia in rats and rabbits. In both yeast-induced and TAB vaccine-induced fever, the fever was significantly reduced and the body temperature was normalized by administration of 200 and 400 mg/kg dose intraperitoneally [26].

Ashrafal et al, has investigated the antibacterial activity of methanolic extract of the root bark of *C.gigantea* along with Minimum inhibitory concentration for methanol extract and its Petroleum ether, chloroform and ethyl acetate fractions were also investigated [27].

Chonticha Seeka et al, has investigated two β -hydroxycardenolides (1,2) and a 16 α -hydroxycalactinic acid methyl ester (3) along with eleven known compounds were isolated from the polar fraction of the CH₂Cl₂ extract and n-BuOH extract of the leaves of *C. gigantea*. The isolated compounds were evaluated for their inhibitory activities against a panel of cell lines [28].

Venkatesh et al, has evaluated the antifungal activity of ethanolic extract of the latex of *C.gigantea* on some fungal strains, using disc diffusion method and serial dilution method and also reported the presence of flavonoids, alkaloids, steroids, saponins, phenols, glycosides due to which the extract should possess the antifungal activity [27].

Joshi et al has reported hydroalcoholic extract of *C.gigantea* for its antioxidant activity by reducing power, DPPH and nitric oxide method. The extract shown significant antioxidant activity [28].

Gaurav Kumar et al, has reported the aqueous, methanol, ethanol and petroleum ether leaf extracts of *C.gigantea* for anti-Candida properties against clinical isolate of *Candida albicans*, *C. parapsilosis*, *C. tropicalis* and *C. krusei*. The in vitro anti-Candida assay was performed and reported the inhibitory effect of aqueous extract on all four tested *Candida* species was significantly higher than the methanol, ethanol and petroleum ether extracts. The result proven the *C.gigantea* as a potent source of natural anti-Candida compounds [29].

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