



## INTERNATIONAL JOURNAL OF PHARMACEUTICAL RESEARCH AND BIO-SCIENCE

### PHYTOCHEMISTRY OF *CALOTROPIS GIGANTEA* - A REVIEW

BHUPENDRA S. MODI

Tolani Institute of Pharmacy, Adipur (Kutch) 370205

Accepted Date: 01/01/2015; Published Date: 27/02/2015

**Abstract:** *Calotropis gigantea* Linn. (Asclepiadaceae) known as Arka is being used in traditional medicines and contains cardiac glycosides, flavanoids, terpenoids, alkaloids, tannins, and resins have been isolated from this plant. Extracts and metabolites from this plant have been found to possess various pharmacological activities. It has been found to have analgesic activity, antipyretic activity, pregnancy interceptive activity, CNS activity, anti-inflammatory activity, procoagulant activity, anti-diarrhoeal activity, free radical scavenging activity, antimicrobial activity, anti-tumor activity, antifungal activity, antitussive activity, antifeedent activity.

**Keywords:** *Calotropis gigantea* Linn, cardiac glycosides, flavanoids, terpenoids, alkaloids, tannins



PAPER-QR CODE

Corresponding Author: MR. BHUPENDRA S. MODI

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How to Cite This Article:

Bhupendra S. Modi, IJPRBS, 2015; Volume 4(1): 182-187

## INTRODUCTION

*Calotropis gigantea* (Asclepiadaceae) is distributed throughout India. It is popularly known as arka in Hindi. India being a tropical country is blessed with best natural resources and ancient knowledge for its judicious utilization. However, in order to make these remedies acceptable to all, there is a need to scientifically evaluate them to identify the active principles and understand the pharmacological action.<sup>1</sup>

Humankind first utilized material found in environment on an empirical basis to cure various ailments. Natural products from plants and animals traditionally have provided the pharmaceutical industry with one of its important sources of lead compounds in search of new drugs and medicines. The search for new pharmacologically active agents from natural resources such as plants, animals and microbes led to discovery of many clinically useful drugs.<sup>2</sup>

India holds a pride of place largely because of its other used and economic values. The fibres extracted from the bark of the stem is white, silky, strong, flexible, durable and used in making ropes for cots, gunny bags, fishing nets, and bow strings. The wood is used as cheap fuel and latex is used in tanning industries. The latex is used as wound healing agent by different traditional healers, it is also used as an abortifacient in folk medicines.<sup>4,5</sup>

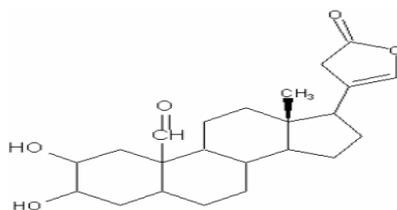
## PHYTOCHEMISTRY

Phytochemically the plants have been investigated for cardenolides from the latex and leaves,<sup>5</sup> triterpenoids<sup>6</sup>, anthocyanins from flowers<sup>7</sup> and hydrocarbons<sup>8</sup>. The leaves and latex of *Calotropis gigantea* were found to have cardiac glycosides, various glycosides were isolated and<sup>9</sup>. An active principle 'mudarine' was isolated from leaves of *C. gigantea*. Beside this, a yellow bitter acid and resin were also found. The cardiac glycosides were identified as Calotropogenin (1), calotropin (2), Uscharin (3) and Calotoxin (4), Calactin (5).<sup>7,10</sup> Three cardenolide glycosides 4-O-befa-D-glucopyranosylfrugoside (8), were obtained as the cytotoxic principles of "akond mul" (roots of *Calotropis gigantea* Linn.). The cytotoxicity of these compounds against various cell lines of human and mouse origin was tested. They showed similar cell line selectivity to those of cardiac glycosides such as digoxin and ouabain. They are toxic to cell lines of human origin, but not to those from mouse at two micrograms/ml<sup>11</sup>. According to Pal et. al,<sup>12</sup> studies on isolation, crystallization, and properties from *C. gigantea* confirm the structure of calotropins DI and DII.

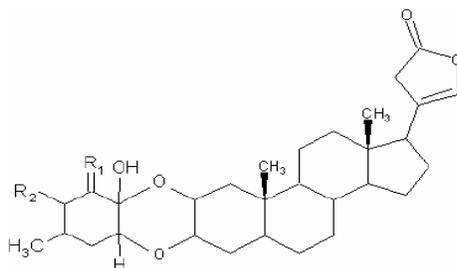
Two new oxypregnane-oligoglycosides named CalotroposidesA (9) and (10) have been isolated from root of *C. gigantea*, an Indonesian medicinal plant, and their chemical structures have been elucidated by chemical and spectroscopic methods as 12-O-benzoyllineolon 3-O-beta-D-cymaropyranosyl(1-4)-beta-D-oleandropyranosyl (1-4)-beta-D-

oleandropyranosyl (1-4)-beta-D-cymaropyranosyl (1-4)-beta-D-cymaropyranoside and 12-O-benzoyl deacetyl metaplexigenin 3-O-beta-D-cymaropyranosyl(1-4)-beta-D-oleandropyranosyl (1-4)-beta-D-oleandropyranosyl (1-4)-beta-D-cymaropyranosyl (1-4)-beta-D-cymaropyranoside, respectively<sup>13</sup>. Besides isolation and characterization of isorhamnetin-3-O-rutinoside (11), isorhamnetin-3-O-glucopyranoside (12) and taraxasteryl acetate, a new flavonol trisaccharide was isolated from the aerial parts of *C. gigantea*, and its structure was established as isorhamnetin-3-O-(2-O-beta-D-galactopyranosyl-6-O-alpha-L-rhamnopyranosyl)-beta-D-glucopyranoside (13) by a combination of fast atom bombardment mass spectroscopy, <sup>1</sup>H and <sup>13</sup>C NMR spectra and some chemical degradations.<sup>14</sup>

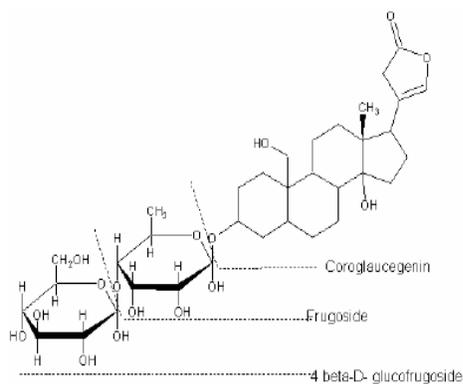
Giganticine, a novel non-protein amino acid, has been isolated from a methanol extract of the root bark of *Calotropis gigantea* and its structure established by spectroscopic methods. It exhibited a significant anti-feedant activity against nymphs of the desert locust *Schistocerca gregaria*.<sup>15</sup> Two proteinase containing carbohydrate, called calotropain-FI and calotropain-FII, were purified from *Calotropis gigantea* latex by CM-Sephadex C-50 chromatography. Both calotropain-FI and FII were found to be homogeneous by rechromatography.<sup>16</sup>



(1) Calotropoginin

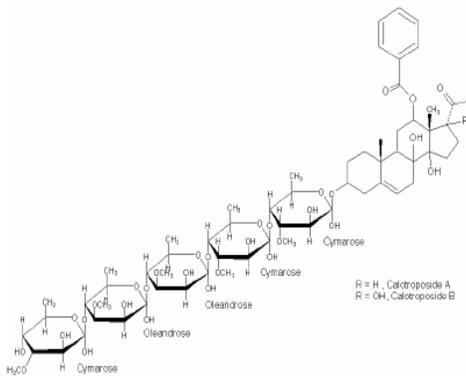


Structure No.	Nomenclature	R <sub>1</sub>	R <sub>2</sub>
2	Calotropin	$\alpha$ -OH, $\beta$ -H	H
3	Uscharin	$\left\{ \begin{array}{l} S-CH_2 \\ N-CH_2 \end{array} \right.$	H
4	Calotoxin	$\gamma$ -H, $\gamma$ -OH	H
5	Calactin	$\alpha$ -H, $\beta$ -OH	H

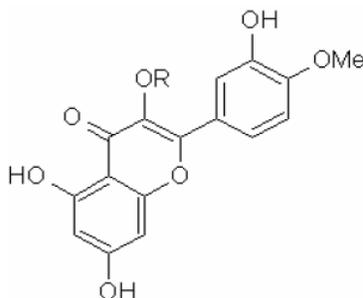


(6) coroglaucegenin, (7) Frugoside,

(8) 4 beta-D-glucofrugoside,



(9) Clotroposide A, (10) Clotroposide B,



Structure No.	Nomenclature	R
11	Isorhamnetin -3-O-rutinoside	Glu-ORha O Gal
12	Isorhamnetin 3-O-glucoside	Glucose
13	Isorhamnetin rhamnoglucoside	Glucose-O-Rhamnose

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