

CALOTROPIS SP- THERAPEUTIC & TOXICOLOGICAL CONSIDERATION**Tewari Ramesh Chandra^{1*}, Chaubey Suresh², Kumar Naveen³, Kour Gagan Deep⁴**

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ABSTRACT

There is nothing in this world which can't be used as medicine after proper consideration. A poison after proper purification if given in appropriate doses, can act as a medicine. While even food in over dose can act as a poison. *Calotropis* also called as *Arka*, is an example of plant having both therapeutic and toxicological properties. According to Ayurveda, action of a drug depends upon seven factors viz. *dravya*, *rasa*, *guna*, *veerya*, *vipaka*, *prabhav* and *karma* while active ingredient present in body is solely responsible for its effect and side effect according to modern science, this is the basic difference in the pharmacological principle of both the sciences. Modern science uses the single active principle in the form of medicine while Ayurveda advocate use of effective part of the plant as a whole. This paper is an attempt of the author to give a detail review of *Calotropis sp.* including both its therapeutic and toxicological considerations.

Key Words: *Calotropis*, *Arka*, *Veerya*

INTRODUCTION:

Acharya Charak has told that there is nothing in the world that can't be used as a medicine after considering about its purification method, dose, *anupana* etc.¹ *Calotropis* also known as *Arka* is an important plant known in our country from the earliest time. It is a plant of "Nav-grahavatika" where it represents the planet sun. It is to be said that one who plants *Calotropis* in front of his house gets name, fame and property. It is a plant having both medicinal and toxic effect on human being, so it should be used after proper knowledge. There are two common species of *Calotropis* viz. *C. gigantea* (Linn.) R.Br. and *C. procera* (Ait.) R.Br.

also called *Swetarka* and *Raktarka* respectively. Both the species are used as substitutes for one another and are said to have similar effects. One species is more commonly used in some parts of the country while the other parts use the other species depending upon the availability of their respective distribution.² *C. gigantea* is said to be distributed throughout India ascending to 100m Himalayas.³ It has been discovered that it has not been easily available at certain localities, even in plains where *C. procera* is more widely distributed and hence being commonly used and known as *Arka* or *Madar*.

Sanskrit Synonyms: *Shwetarka* is also known as *ganaroop-gregarious*, *Rupika* – well known plant, *sadapuspa* (flowers all the year), *Arka*, *balarka*, *raktapuspa* (colour of rising sun), *ksiraparna*, *ksirakandak* (having latex in leaves and stem), *sukaphala* (parrot like fruits), *Asphota* (fruit burst when mature), *vikirna* (show dispersal of seeds).⁴

Botanical Description: *Calotropis gigantea*

R.Br. – It is a middle sized shrub, young parts covered with appressed white tomentum, bark pale, leaves subsessile, 4-8 by 1-4 inches, obovate or oblong, acute or acuminate, coriaceous, cottony beneath, base cordate. Flowers down outside on long pedicels arranged in axillary or subterminal pedunculate simple or compound umbels or corymbs, buds ovoids, corolla dull purple or white, 0.5 – 1 inch diameter, lobes ovate lanceolate, spreading. Seeds ovate, 0.25 inch long, with a bright silky white coma. Flowering and fruiting throughout the year.

***Calotropis procera* R.Br.** – Leaves and inflorescence as of the preceding species, excepting that the leaves are more gradual narrowed and somewhat less cottony beneath when matured, and the peduncles are rather long. Flowers purplish red, silvery outside, odorous, buds hemispherical. Corolla lobes erect. Corona scales acute nearly as broad as long, glabrous or pubescent, follicles 3-4 inch long, recurved.⁵

Part Used: All the parts viz. root, stem, leaves and flowers of *Calotropis* are used in indigenous system of medicine.⁶ The serum derived from its latex contain an active principle, gigantol, which is highly toxic.⁷

Therapeutic Dose⁸ –

Root bark powder ½ to 1 grams

For inducing emesis – 3 to 5 grams

Latex – 1/8 to ¼ grams

Flower – 1 to 2 grams

Fatal Dose – uncertain

Chemistry –

- The flowers contain ester of b-calotropeols, b-amysin, volatile and 1 mg chain fatty acids, ester of waxy acids and alcohols.
- The stem bark contains d and b calotropeols, b-amysin, gigantol, a colourless wax, small amounts of tetracyclic terpene and traces of sterols. A highly active proteolytic enzyme calotropin has been isolated in the latex.⁹ The latex is reported to contain cardiac steroid glucosides.¹⁰ Actually the active principles present in the plant are uscharin, calotoxin, calotropin and gigantol.

Toxic signs and symptoms – **LOCALLY** –

It can give rise to lesions resembling bruises on skin (called fabricated injuries), which at times can lead to pustule formation and vesication. Juice when installed into the eyes or coming in contact with eyes can result in severe conjunctivitis.

ORALLY – When taken orally it produces bitter taste, burning pain in the throat, salivation, nausea, vomiting etc. followed by diarrhea, pain in abdomen, mydriasis, tetanic convulsions, delirium, collapse and death.¹¹

Medico legal importance – Roots of *C. procera* is poisonous to cobra snakes, snake charmers use its root to scare away snake or to subdue them.¹² It may be used as cattle poison by mixing them with fodder or inserting a cloth smeared with the juice inside rectum of the animal.¹³ The juice is applied on the skin to produce chemical lesion to bring a false charge of assault on an enemy.¹⁴ Latex is sometimes used as a depilatory and arrow poison. The juice is taken by mouth or introduced into uterus on an abortion stick for criminal abortion, sometimes used for infanticide.¹⁵

OTHER USES – The hair of the seeds makes a good stuffing material for pillow and cushions and mixed with a small proportion of ordinary cotton can also be spun into thread. The fiber of the stem is used for bow strings, fishing lines and nets. The wood is made for gun powder charcoal in Deccan.¹⁶

Ayurvedic Classification – Charak has described only one variety of *Calotropis* by the name of *Arka*, Sushruta has described two varieties by the name of *Arka* and *Alarka*. On the basis of flower colour, Bhavprakash also described two varieties *shweta* and *rakta*.¹⁷ Mahendra Bhogik has described two varieties *Arka* and *Rajarka*¹⁸ and Narhari of *Rajnighantu* has described 4 varieties by the name of *Arka*, *Rajarka*, *suklarka* and *swetamandarka*. On the basis of its properties it is considered as vegetable mercury.¹⁹ Acharya Charak had classified it under *Bhedniya*, *swedopag* and *vamanopag mahakashaya*²⁰ while Sushruta classified it under *Arkadigana* and *Adhobhaghar dravya*²¹.

Specific Preparation²²: *Arka Lavana*, *Arka Taila*, *Arkeshwar*, *Habbhaija*

Pharmacology –

- Shukla and Krishnamurti (1961) reported the presence of a powerful **bacteriolytic** agent from the latex of *C. procera* which is capable of lysing *Micrococcus lysodeikticus*.²³
- Prakash et al (1978) reported that 50% ethanolic extract of the leaves of *Calotropis procera* and *gigantea* have 20% **Anti-implantation activity** when administered at the dose of 50, 200 mg/kg body wt. respectively.²⁴
- Flowers with black pepper are useful in **asthma**.²⁵
- The dry latex (DL) of *Calotropis procera* possessing potent anti-inflam-

matory activity was evaluated for its antioxidant and antihyperglycemic effects in rats with alloxan-induced diabetes.²⁶

- The anticonvulsant activity of different root extracts of *Calotropis procera* was studied in rats in order to evaluate the traditional use of this plant. The anticonvulsant activity of different extracts of *Calotropis procera* roots was studied using seizures induced by maximal electroshock seizures (MES), pentylenetetrazol (PTZ), lithium-pilocarpine and electrical kindling seizures.²⁷
- The alcoholic extract of the flowers of *C. gigantea* was reported for analgesic activity in chemical and thermal models in mice. The analgesic activity was performed by acetic acid induced writhing test and hot plate method. Oral dose of ethanolic extract of *C. gigantea* flower produced a significant decrease in the number of writhings and delay in paw licking time.²⁸
- Methanol extract of *C. gigantea* root bark and its chloroform and petroleum ether fractions were evaluated for residual film toxicity, fumigant toxicity and repellent effect against several inster of larvae and adult of *Tribolium castaneum*.²⁹
- The latex of *C. gigantea* is reported to carry procoagulant activity. The latex extract hydrolysed casein, human fibrinogen and crude fibrin clot in a dose dependent manner.³⁰
- Ethanol extract of stems of *C. gigantea* was reported for hepatoprotective activity in male Wistar rats against carbon tetrachloride induced liver damage.³¹
- Root bark useful for treating chronic cases of dyspepsia, flatulence, constipation, loss of appetite and mucous in

stool. The dried whole plant is good tonic, expectorant, depurative and anti-helminthic. The dried root bark is a substitute for ipecacuanha. The root bark is antihelminthic, depurative, expectorant and laxative and is useful in cutaneous diseases, intestinal worms, cough, ascites and anasarca. The powdered root promotes gastric secretion and is useful in asthma, bronchitis and dyspepsia. The leaves are useful in the treatment of paralysis, arthralgia, swelling and intermittent fevers. The flowers are bitter, digestive, astringent, stomachic, antihelminthic and toxic. They are useful in asthma, catarrh, anorexia, inflammation and tumours. In large doses it is purgative and emetic.³²

Classical Indication—The latex of *Arka* is used both for emesis and purgation.³³

1. For *kaphaj yoni vyapad* (disease of female genital tract of *kaphaj* origin), powdered barley mixed with rock salt is impregnated with *Calotropis* latex and a suppository is made which is kept in vagina followed by sprinkling with topid water.³⁴
2. Fumigation with *Calotropis* root and *Prosopis cineria* is beneficial in piles.³⁵
3. In skin diseases, when maggots appear one should take decoction of leaves of *Calotropis* and back of *Alstonia scholaris*.³⁶
4. After purification with *Calotropis* latex, a person with Rabies bite should be given oil and paste of *Sisamum*, latex of *Calotropis* and Jaggery all combined together to get rid from rabies.³⁷
5. Parched grains or churned drink made of barley and mixed with leaf buds of *calotropis* and honey relieves bronchial asthma.³⁸
6. Filling of teeth with the latex of *Alstoniascholaris* and *Calotropis* allays pain.³⁹
7. Leaves of *calotropis* mixed with rock salt, burnt by close heating. The remaining burnt ash should be taken with curd water in severe splenomegaly.⁴⁰
8. Oil made by *Curcuma longa* seasoned with juice of leaf of *calotropis* cures eczema and scabies itching.⁴¹
9. After giving an incision on the site of scorpion bite, application of latex of *Calotropis* subsides effect of scorpion poisoning.⁴²
10. Root of *calotropis* pounded with cow urine is pasted on the boil to subside it.
11. Mature leaf of *calotropis* smeared with ghee and heated on fire is pressed to extract juice which is dropped into the ear in case of earache.
12. *Calotropis* removed maggot, pus etc. from the ear.⁴³

CONCLUSION – Both species of *Calotropis* are wildly and abundantly available. They have plenty of therapeutic and a few toxic effect. There is no mention of purification in any classical text but it should be used cautiously. It is a best drug of *kapha-vataja* disorder, it aggravates *pitta*. It is specially indicated for *Shwasa, kasa, aruchi, gulma, kushtha, udarroga, kandu, vrana* etc.

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