CALOTROPIS SP- THERAPEUTIC & TOXICOLOGICAL CONSIDERATION
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INTRODUCTION:
Acharya Charak has told that there is nothing in the world that 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.

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, sadapusp (flowers all the year), Arka, balarka, raktrapusp (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 lenceolate, 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 lobs 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, gigantin, which is highly toxic.7

Therapeutic Dose8 –
- Rootbark 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, giganteol, acolourless 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 gigantin.

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 vasication. 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 smokes, 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, sukarka 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 mahakashaya²⁰ while Sushruta classified it under Arkadigana and Adhobhaghar draavya²¹.

Specific Preparation ²²: 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 lyso- deikticus.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-inflammatory 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), pentylentetrazol (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 antihelmintic. The dried root bark is a substitute for ipecacuanha. The root bark is antihelmintic, 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 intermitting fevers. The flowers are bitter, digestive, astringent, stomachic, antihelmintic and toxic. They are useful in asthma, catarrh, anorexia, inflammation and tumours. In large doses it is purgative and emetic.

**Classical Indication**—The latex of Arka is used both for emesis and purgation.  
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.
2. Fumigation with Calotropis root and Prosopis cineria is beneficial in piles.
3. In skin diseases, when maggots appear one should take decoction of leaves of Calotropis and back of Alstonia scholaris.
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.
5. Parched grains or churned drink made of barley and mixed with leaf buds of calotropis and honey relieves bronchial asthma.
6. Filling of teeth with the latex of Alstonia scholaris and Calotropis allays pain.
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.
8. Oil made by Curcuma longa seasoned with juice of leaf of calotropis cures eczema and scabies itching.
9. After giving an incision on the site of scorpion bite, application of latex of Calotropis subsides effect of scorpion poisoning.
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.

**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 Shwas, kasa, aruchi, gulma, kushtha, udarropa, kandu, vrana etc.

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