

**CALOTROPIS SP- THERAPEUTIC & TOXICOLOGICAL CONSIDERATION****Tewari Ramesh Chandra<sup>1\*</sup>, Chaubey Suresh<sup>2</sup>, Kumar Naveen<sup>3</sup>, Kour Gagan Deep<sup>4</sup>**<sup>1</sup>Associate Professor, Dept. of Agadtantra, Rishikul Campus - Uttarakhand Ayurveda University, Haridwar, Uttarakhand, India.<sup>2</sup>Associate Professor, PG Dept. of Dravyaguna, Rishikul Campus - Uttarakhand Ayurveda University, Haridwar, Uttarakhand, India.<sup>3,4</sup>PG Scholar, PG Dept. of Dravyaguna, Rishikul Campus - Uttarakhand Ayurveda University, Haridwar, Uttarakhand, India**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.<sup>1</sup> *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.<sup>2</sup> *C. gigantea* is said to be distributed throughout India ascending to 100m Himalayas.<sup>3</sup> 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).<sup>4</sup>

**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.<sup>5</sup>

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

**Therapeutic Dose<sup>8</sup>** –

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-calotropols*, *b-amysin*, volatile and 1 mg chain fatty acids, ester of waxy acids and alcohols.
- The stem bark contains *d* and *b calotropols*, *b-amysin*, *giganteol*, *acolorless wax*, small amounts of tetracyclic terpene and traces of sterols. A highly active proteolytic enzyme *calotropin* has been isolated in the latex.<sup>9</sup> The latex is reported to contain cardiac steroid glucosides.<sup>10</sup> 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 vascification. 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.<sup>11</sup>

**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.<sup>12</sup> 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.<sup>13</sup> The juice is applied on the skin to produce chemical lesion to bring a false charge of assault on an enemy.<sup>14</sup> 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.<sup>15</sup>

**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.<sup>16</sup>

**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*.<sup>17</sup> Mahendra Bhogik has described two varieties *Arka* and *Rajarka*<sup>18</sup> 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.<sup>19</sup> Acharya Charak had classified it under *Bhedniya*, *swedopag* and *vamanopag mahakashaya*<sup>20</sup> while Sushruta classified it under *Arkadigana* and *Adhobhaghar dravya*<sup>21</sup>.

**Specific Preparation**<sup>22</sup>: *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*.<sup>23</sup>
- 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.<sup>24</sup>
- Flowers with black pepper are useful in **asthma**.<sup>25</sup>
- 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.<sup>26</sup>

- 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.<sup>27</sup>
- 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.<sup>28</sup>
- 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*.<sup>29</sup>
- 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.<sup>30</sup>
- Ethanol extract of stems of *C. gigantea* was reported for hepatoprotective activity in male Wistar rats against carbon tetrachloride induced liver damage.<sup>31</sup>
- 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.<sup>32</sup>

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

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.<sup>34</sup>
2. Fumigation with *Calotropis* root and *Prosopis cineria* is beneficial in piles.<sup>35</sup>
3. In skin diseases, when maggots appear one should take decoction of leaves of *Calotropis* and back of *Alstonia scholaris*.<sup>36</sup>
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.<sup>37</sup>
5. Parched grains or churned drink made of barley and mixed with leaf buds of *calotropis* and honey relieves bronchial asthma.<sup>38</sup>
6. Filling of teeth with the latex of *Alstoniascholaris* and *Calotropis* allays pain.<sup>39</sup>
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.<sup>40</sup>
8. Oil made by *Curcuma longa* seasoned with juice of leaf of *calotropis* cures eczema and scabies itching.<sup>41</sup>
9. After giving an incision on the site of scorpion bite, application of latex of *Calotropis* subsides effect of scorpion poisoning.<sup>42</sup>
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.<sup>43</sup>

**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.

## REFERENCES

1. Agnivesha, Charaka Samhita, Commentary by Pt. KashinathaShastri and Dr. GangasahayaPandeya, Part I, Sutra Sthana, AtreyabhadrakapiyaAdhyaya, 26/12, Varanasi: Chaukhamba Sanskrit Sansthan, Reprint : 2006; p. 37
2. K. Raghunathan and Miss Roma Mitra – 1999-vol-I , CCRAS, New Delhi, page 90.

3. Hooker, J.D. 1885 The flora of British India IV: 17-18, L. Reeve & co. Ltd. Kent (1954 reprinting).
4. Sharma PV, Naamrupajnanam, ChaukhambaBharti Academy, Varanasi, Print : 1999; p. 15-16
5. Kanjilal U.N., Forest flora of the Chakrata, Dehradun and Saharanpur forest Division, Natrajpublishers, Print : 2004; p. 345.
6. Sharma PV, Dravyagunavigyana II, ChaukhambaBharti Academy Varanasi, Print : 1994; p. 435.
7. Parikh C. K., Parikh's Textbook of Medicinal Jurisprudence forensic Medicine and Toxicology – CBS Publishers, New Delhi, Print : 2005; p. 936.
8. Singh Ram Sushil, Vanoshdhi Nidarshika (AyurvedicPharmacopia)Uttarpradesh hind sansthan- Lucknow; p. 33-34.
9. Anonymous 1952, The Wealth of India ; Raw Materials II 20-23, CSIR, New Delhi, CSIR, New Delhi.
10. Anonymous 1956, Chemical and Industry (review) London.
11. Rao Nagesh Kumar, Textbook of Forensic Medicine of Toxicology- JP Brothers Medical Publishers, Print : 2010; p. 477.
12. Bardale Rajesh, Principles of forensic medicine and toxicology – Jaypee Brothers Medical Publishers (P) Ltd., New Delhi, Print : 2011; p. 473.
13. Biswas Gautam, Review Of Forensic Medicine and Toxicology. J.P. Brothers, New Delhi, Print : 2010; p. 374.
14. Nandy Apurba, Principles of Forensic Medicine including toxicology – New Central Book Agency (P) Ltd. Delhi, Print : 2010; p. 816.
15. UrmaliyaNitin, Text Book Of Agad Tantra, ChaukhambaOrientalia, Delhi, Reprint : 2011; p. 74.
16. Kanjilal U.N., Forest flora of the Chakrata, Dehradun & Saharanpur forest division – Natraj publishers Dehradun, Print : 2004; p. 345.
17. Chunekar K.C., Bhavprakash Nighantu, ChaukhambaBharti Academy Varanasi, Print : 2002; p. 303.
18. Prof. PriyaVrata Sharma and Dr. Guru Prasad Sharma, DhanvantariNighantu, Varanasi : Chaukhambha Orientalia, Reprint : 2012; p. 123
19. Dr. IndradeoTripathi, Raja Nighantu of PanditNarahari, Varanasi : ChaukhambhaKrishnadas Academy, Reprint : 2003; p. 302,303
20. Agnivesha, Charaka Samhita, Commentary by Pt. Kashinatha Shastri and Dr. Gangasahaya Pandeya, Part 1, Sutra Sthana, Shadvirechanashatashritya Adhyaya, 4/4,22,23 Varanasi: Chaukhamba Sanskrit Sansthan, Reprint : 2006; p. 73,84
21. Maharishi Sushruta, SushrutaSamhita part I, Sutra Sthana, Dravyasangrahaniya Adhyaya, 38/16, Edited by Ambikadatta Shastri, Chaukhamba Sanskrit Sansthan, Varanasi. Reprint: 2007; p. 142
22. Singh Ram Sushil, Vanoshdhi Nidarshika (AyurvedicPharmacopia) Uttarpradesh hind sansthan- Lucknow, p. 33-34.
23. Shukla, O.P. and Krishna Murti, C.R. – Properties and partial purification of a bacteriolytic enzyme from the latex of *C. procera*. J. Sci. Industr. Res., 20c;109-112.
24. Prakash, A.O. Gupta R.B. and Mathur R. 1978, Effect of oral administration of

- forty two indigenous plant extract on early and late pregnancy in Albino rats. Probe. 27(4); 315-323; X- clinical study Sachitra Ayurveda 1980-81,33,119-210.
25. Asolkar L.V., Kakkar K.K., Second supplement to Glossary of Indian Medicinal Plant with active principles, CSIR- New Delhi, 1965-198; p. 157-158.
  26. Kumar VL, Padhy BM, Sehgal R, Roy S. Antioxidant and protective effect of latex of *Calotropis procera* against alloxan-induced diabetes in rats. Journal of Ethnopharmacology, 2005, 102 (3): 470-473.
  27. Jalalpure SS. Anticonvulsant effects of *Calotropis procera* root in rats. Pharmaceutical biology, 2009, 47 (2): 162-167
  28. Pathak AK, Argal A, Analgesic activity of *Calotropis gigantea* flower. Fitoterapia 2007;78(1):40-42
  29. Alam MA, Habib MR, Nikkon F, Khalequzzaman M, Karim MR, Insecticidal activity of root bark of *Calotropis gigantea* L. against *Tribolium castaneum* (Herbst). World Journal of Zoology 2009;4(2):90-95.
  30. Rajesh R, Raghavendra Gowda CD, Nataraju A, Dhananjaya BL, Kemparaju K, Vishwanath BS, Procoagulant activity of *Calotropis gigantea* latex associated with fibrin(ogen)olytic activity. Toxicon 2005;46(1):84-92.
  31. Lodhi G, Singh HK, Pant KK, Hussain Z, Hepatoprotective effects of *Calotropis gigantea* extract against carbon tetrachloride induced liver injury in rats. Acta. Pharm. 2009;59:89-96.
  32. Prajapati Narayan Das Purohit S.S., Sharma Arun K., A handbook of Medicinal plants a complete source book – 2003, Agrobios (INDIA), Jodhpur, page -106-section II.
  33. Agnivesha, Charaka Samhita, Commentary by Pt. Kashinatha Shastri and Dr. Gangasahaya Pandeya, Part I, Sutra Sthana, Dirghanjeevatiya Adhyaya, 1/115, Varanasi: Chaukhamba Sanskrit Sansthan, Reprint : 2006; p. 37
  34. Agnivesha, Charaka Samhita, Commentary by Pt. Kashinatha Shastri and Dr. Gangasahaya Pandeya, Part II, Chikitsa Sthana, Yonivyapadachikitsa, 30/71, Varanasi: Chaukhamba Sanskrit Sansthan, Reprint : 2006; p. 761
  35. Ibidem, Charaka Samhita (34), Arsha Chikitsa, 14/45; p. 352
  36. Maharishi Sushruta, Sushruta Samhita part I, Chikitsa Sthana, Kushtha Cikitsa Adhyaya, 9/51, Edited by Ambikadatta Shastri, Chaukhamba Sanskrit Sansthan, Varanasi. Reprint: 2007; p. 54
  37. Ibidem, Sushruta Samhita (36), Kalpa Sthana, Mushika Kalpa, 7/51; p. 62
  38. Maharishi Sushruta, Sushruta Samhita part II, Uttara Tantra, Shvasa Pratisheda, 51/37, Edited by Ambikadatta Shastri, Chaukhamba Sanskrit Sansthan, Varanasi. Reprint: 2007; p. 380
  39. Bhisagacharya Harishastri Paradakara-Vaidya, Ashtang Hridayam of Vagbhatta, Uttarasthana, 22/20, Chaukhambha Orientalia, Varanasi. Reprint : 2005; p. 852
  40. Pandit Shri Brahma Shankra Mishra, Bhavaprakasha of Shri Bhavamishra, Pleehayakrida Adhikara, 33/12, Part II, Varanasi : Chaukhambha-Sanskrita Sansthana, Ninth Edition : 2005; p. 349
  41. Ibidem, Bhavaprakasha of Shri Bhavamishra, Kushtharoga Adhikara, 54/136; p. 541
  42. Shri Indradeva Tripathi, Gadanigraha of Shri Vaidya Sodhala, Part III, Vri-shchikavishchikitsa Adhikara, 5/1, Chaukhambha Sanskrita Sansthan, Varanasi, Reprint : 2005; p. 591

43. PriyaVrat Sharma, Classical uses of Medicinal Plants, ChaukhambhaVishwabharati, Reprint : 2004; p. 19

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