e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
( Peer-Reviewed, Open Access, Fully Refereed International Journal )
Volume:06/Issue:01/January-2024 Impact Factor- 7.868 www.irjmets.com

# THE BRIEF REVIEW ON CALOTROPIS GIGANTEA

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DOI : https://www.doi.org/10.56726/IRJMETS48073

## ABSTRACT

Calotropis gigantea is one such plant. In this review the systematic position, vernacular names, distribution, phytochemistry and the economical values and their pharmacology morphology of the Calotropis gigantea are discussed. C. gigantea is extensively studied for its medicinal properties by advanced scientific techniques and a variety of bioactive compounds have been isolated from the different parts of the plant and were analysed pharmacologically. The plant is reported for analgesic activity, antimicrobial activity, antioxidant activity, anti-pyretic activity, insecticidal activity, cytotoxicity activity, hepatoprotective activity

**Keywords:** Calotropis, morphology , gigantea, calotropis, anti-inflammatory, herbal

## I. INTRODUCTION

C. gigantea is a common wasteland weed and commonly known as giant milk weed. This plant is a native of Bangladesh, Burma, China, India, Indonesia, Malaysia, Pakistan, Philippines, Thailand and Sri Lanka. The plant has oval, light green leaves, milky stem and clusters of waxy flowers that are either white or lavender in colour. C. gigantea is frequently available in India and used for several medication purposes in traditional medicinal system. Most recently C. gigantea is scientifically reported for several medicinal properties[1]

From pre-historic times to the modern era in many parts of the world and India, plants, animals and other natural objects have profound influence on culture and civilization of man. Since the beginning of civilization, human beings have worshiped plants and such plants are conserved as a genetic resource and used as food, fodder, fibre, fertilizer, fuel, febrifuge and in every other way Calotropis gigantea is one such plant , ancient ayurvedic medicine the plant Calotropis gigantea is known as “Sweta Arka” and Calotropis procera as “Raktha Arka”. Both of them are often similar in their botanical aspects and also have similar pharmacological effects [2]

Medicinal plants are major source of the traditional medicine in India. India is considered as “Botanical Garden of World”. A large segment of Indian population use medicinal plants for their health security. India has 15 agroclimatic zones and 17000-18000 species of flowering plants of which 6000-7000 are estimated to have medicinal usage in traditional systems of medicines (Anonymous, 2015). The Medicinal and Aromatic Plants contain a large number of chemical constituents which are the major source of therapeutic agents to cure human discomfort. The World Health Organization has also recognized the role of traditional systems of medicine, which depend largely upon the medicinal plants. The use of Medicinal and Aromatic Plants throughout the world has been increasing by the rate of 7-15 % annually. Calotropis gigantea (L.) Dry and is one of such plants, which has long tradition of use in various systems of medicine. Thus, a review has been compiled on ethnopharmacological uses, chemical constituents and pharmacology of C. gigantea [4]

**Fig .1:** Calotropis Gigantea plant [15].

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**Table 1:** Taxonomical classification of Calotropis gigantea Linn. [13]

| | |
|---|---|
| **Kingdom** | Plantae |
| **Order** | Gentianales |
| **Family** | Apocynaceae |
| **Subfamily** | Asclepiadaceae |
| **Genus** | Calotropis |
| **Species** | C.gigantea |

**Table 2:** Vernacular names of Calotropis gigantea Linn. [13]

| | |
|---|---|
| Common names | Giant Milkweed, Crown Flower, Swallow Wort. |
| Hindi | Safed aak, Aak, Alarkh, Madar, Sveta Arka, Akanda, Bara Akand. |
| Marathi | Ruiee |
| Gujarati | Aakando |
| English | Crown flower, giant Indian milkweed. Bowstring hemp, crownplant, Madar Malaysia: Remiga, rembega, kemengu |
| Indonesia | Bidhuri (Sundanese, Madurese), sidaguri (Javanese), rubik (Aceh). |
| Philippines | Kapal-kapal (Tagalog). |
| Thailand | Po thuean, paan thuean (northern), rak(central) |
| French | Faux arbre de soie, mercure vegetal |

- **Botanical Description**- A tall shrub reaching 2.4- 3m high; back yellowish white, furrowed; branches stout, terete, more or less covered (especially the younger ones) with fine appressed cottony pubescence. Leaves 1-20 by 3.8-10 cm, sessile or nearly so, elliptic-oblong or abovate-oblong, acute, thick, glaucous-green, clothed beneath and more or less above with fine cottony tomentum; base narrow, cordate. Flowers inodorous, purplish or white. Calyx divided to the base; sepals 6 by 4 mm, ovate, acute, cottony. Corolla 2 cm long or more; lobes 1.3-1.6 cm long, deltoid-ovate, subacute, revolute and twisted in age; lobes of the corona1 3cm long by 5 mm pubescent on the slightly thickened margin, the apex rounded with 2 obtuse auricles just below it. Follicles 9-10 cm Long, broad, thick, fleshy, ventricose, green. Seeds numerous, 6 by 5 mm, broadly ovate, flattened narrowly margined, minutely tomentose, brown coma 2.5-3.2 cm long [3]
- **Phytochemistry -**The chemical constituents of C. gigantea and C. procera have been extensively investigated, leading to the isolation of many oxypregnanes, terpenoids, sterols, cardenolides and flavonoids (Table 1). Of these classes of compounds, the cardenolides are outstanding in that many have anticancer properties by being cytotoxic to human cancer cells. Afroside, calactin, calotoxin, calotropagenin, calotropin, frugoside, 15β-hydroxycalactin, 12β-hydroxycoroglaucigenin, 15β-hydroxyuscharin, uscharidin, uscharin and uzarigenin are cardenolides reported in both species Cardenolides are C23 steroids consisting of an unsaturated five-membered lactone ring with a double bond, which is attached to a steroid nucleus at C-17 and a sugar moiety at C-3 (Figure 2) [57]. The biosynthetic pathway of cardenolides involves cholesterol → 20α-hydroxycholesterol → pregnenolone → progesterone → cardenolide [58]. They are a large group of compounds with considerable structural diversity and have long been used as drugs for treating congestive heart failures [59,60]. Recently, their roles in the treatment of cancer have been established as they can induce apoptosis and inhibit the growth of cancer cell lines. At low concentrations, cardenolides have cytoprotective effects by stimulating proliferation and inhibiting cell death in normal cells [59]. Phytochemical studies have revealed that cardenolides are involved in complex cell-signal transduction mechanisms, resulting in the selective control of human tumour but not the proliferation of normal cells [60].

  Therefore, cardenolides are promising agents for targeted cancer chemotherapy.[11]

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- **Geographic distribution of**

It is a native of India, China and Malaysia and distributed in the following countries: Afghanistan, Algeria, Burkina Faso, Cameroon, Chad, Cote d'Ivoire, Democratic Republic of Congo, India, Iran. Iraq, Israel, Kenya, Kuwait, Lebanon, Libyan, Arab Jamahiriya, Mali, Mauritania, morocco, Mozambique, Myanmar, Nepal, Niger, Nigeria, Oman, Pakistan, Saudi Arabia, Senegal, sierra Leone, Somalia, Sudan, Syrian Arab Republic, Paraguay, Peru, Puerto Rico, St Kitts and Nevis, St Lucia, St Vincent, and the Grenadines, Surinam, Trinidad and Tobago, Uruguay, Venezuela and Virgin Islands Tanzania, Thailand, Uganda, United Arab emirates, Vietnam, Yemen, Republic of Zimbabwe, Exotic: Antigua and Barbuda, Argentina, Australia, Bahmas, Barbados, Bolivia, Brazil, chile, ColombiaEgypt, Eritrea, Ethiopia, Gambia, Ghana, guinea-Bissau, , Cuba, Dominica, Dominican Republic, Ecuador, French Guina, Grenada, Guadeloupe, Guatemala, Guyana, Haiti, Honduras, Jamaica, Martinique, Mexico, Montserrat, Netherlands Antilles, Nicaragua, Panama, (US)

- **The features of Calotropis gigantea**

**a.** The plant grows very well in a variety of soils and different environmental conditions
**b.** It does not require cultivation practices
**c.** It is one of the few plants not consumed by grazing animals
**d.** It thrives on poor soils particularly where overgrazing has removed competition from native grasses
**e.** Sometimes this plant is the only survivor in some areas, where nothing else grows
**f.** It is drought tolerant and the pioneer vegetation in desert soil
**g.** Presence of latex, extensively branched root system and thick leaves with waxy coverage are the xerophytic adaptations.
**h.** Hence, it is distributed in tropical and subtropical area of the world and throughout India. [2]
**i.** **Inflorescence:** A thick, multi-bloomed, umbellate, peduncled cymes, emerging from the hubs and seeming axillary or terminal. [12]

**Table no 3:**Various chemical constituents isolated from C. gigantea Linn

| Class of Chemical Constituent | Name of Chemical Constituent | Plant Part Used | Extract Taken |
|---|---|---|---|
| **Triterpenoids** | Di-(2-ethylhexyl) Phthalate | Flowers | Ethyl acetate extract |
| | Anhydrosophoradiol-3-acetate | | |
| | Lupeol | Aerial parts | Latex |
| | α –Taraxerol | Root bark | Ethyl acetate extract |
| **Triterpene esters** | γ-Taraxasterol | Aerial parts | Hexane and methanol soluble extract |
| | Lupenyl-1-acetate | Root bark | Petroleum ether extract |
| **Flavonol** | Isorhamnetin | Aerial parts | Methanol extract |
| **Cardiac glycosides** | Calotropone | Roots | Ethanol extract |
| | Gofruside | | |
| **Steroids** | Stigmasterol | Root bark | Methanol extract |
| | β-Sitosterol | | |
| | β–Sitosterolacetate | | Ethyl acetate extract |
| **Resin** | β-Amyrin | Root bark | 95 % Alcohol extract |
| | β-Amyrin acetate | | |
| **Fatty acids** | Isovaleric acid | Root bark | 95 % Alcohol extract |
| **Miscellaneous** | Asclepin | Roots | Latex |

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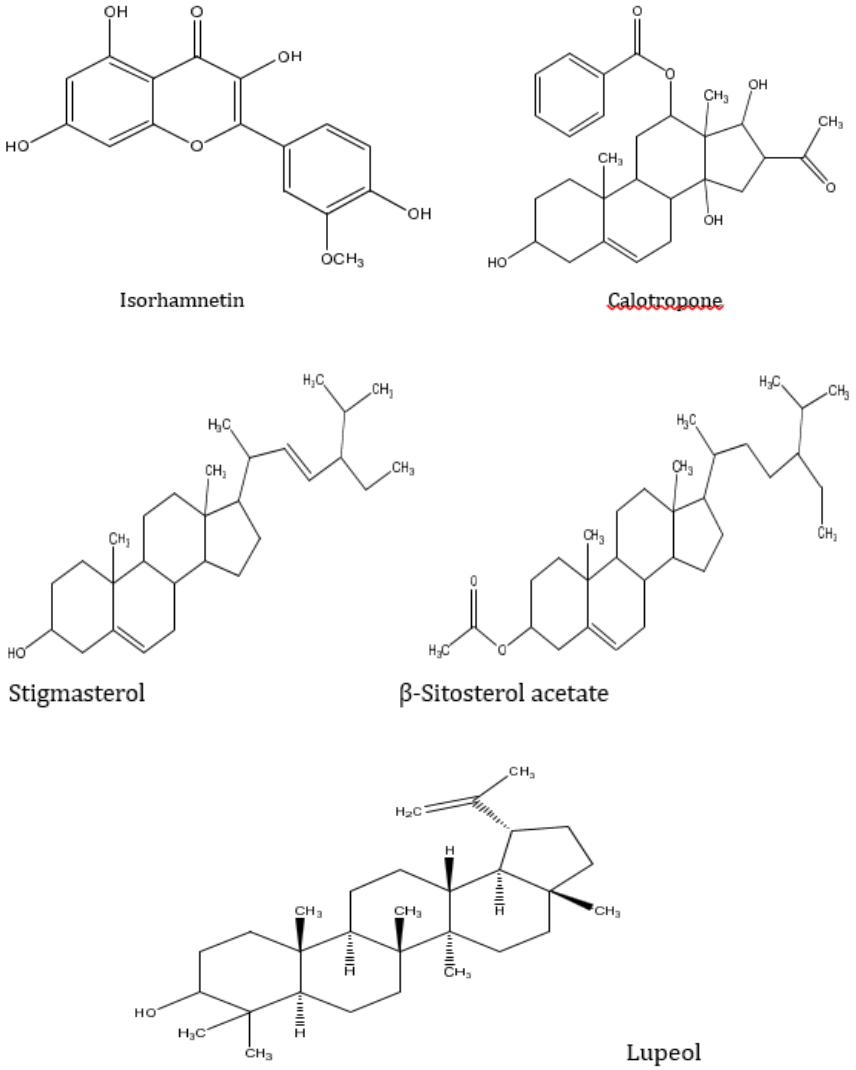


**Fig no. 2:** Chemical structures of various chemical constituents isolated from C. gigantea [13]

**Table no 4.:** medicinal properties of calotropis gigantea [2]

| Sl.No | Medicinal properties | References |
|---|---|---|
| 1. | Asthma | [2] |
| 2. | Abortifacient | [2] |
| 3. | Analgesic and Antinociceptive activity | [2] |
| 4. | Antifertility and emmenagogue | [2] |
| 5. | Anti-inflammatory activity | [2] |
| 6. | Anthelmintic activity | [2] |
| 7. | Anti cancer activity | [2] |
| 8. | Anti dote for Scorpion stings and insect bites | [2] |
| 9. | Anti tumor activity | [2] |
| 10. | Anti-diarrheal and anti dyssentry activities | [2] |

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| | | |
|---|---|---|
| 11. | Antimicrobial activity | [2] |
| 12. | Antiviral activity | [2] |
| 13. | Anxiety and pain | [2] |
| 14. | CNS activity | [2] |
| 15. | Cold | [2] |
| 16. | Expectorant | [2] |
| 17. | Cytostatic activity | [2] |
| 18. | Cytotoxic activity | [2] |
| 19. | Dyspepsia | [2] |
| 20. | Eczema | [2] |
| 21. | Elephantiasis | [2] |
| 22. | Epilepsy | [2] |
| 23. | Elephantiasis of the legs and scrotum | [2] |
| 24. | Expectorant | [2] |
| 25. | Fever | [2] |
| 26. | Fibrinolytic activities | [2] |
| 27. | Free radical Scavenging activity | [2] |
| 28. | Healing the ulcers and blotches | [2] |
| 29. | (Goat) Motility of mature Haemonchus contortus of goat origin | [2] |
| 30. | Indigestion | [2] |
| 31. | kesarayer disease | [2] |
| 32. | Leprosy | [2] |
| 33. | Liver injuries as well as on oxidative stress, Hepatoprotective | [2] |
| 34. | Mental disorders | [2] |
| 35. | Migrine | [2] |
| 36. | Nasal ulcer, laxative, rheumatoid arthritis, bronchial asthma, diabetes mellitus, nervous disorders | [2] |
| 37. | Piles | [2] |
| 38. | Pregnancy interceptive activity | [2] |
| 39. | Purgative | [2] |
| 40. | Removing anemia | [2] |
| 41. | Rheumatism | [2] |

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| | | |
|---|---|---|
| 42. | Ringworm of the scalp | [2] |
| 43. | secondary syphilis, gonorrhea, ascites, helminthiasis, and jaundice | [2] |
| 44. | Skin diseases | [2] |
| 45. | Spleen disorder | [2] |
| 46. | Swelling and inflammation in sprain | [2] |
| 47. | TB and leprosy | [2] |
| 48. | Uterus stimulant | [2] |
| 49. | Vermicidal activity | [2] |
| 50. | (Vertenery) Camel diseases treatment | [2] |
| 51. | Worms | [2] |
| 52. | Wounds and ulcers | [2] |
| 53. | Wound healing activity | [2] |

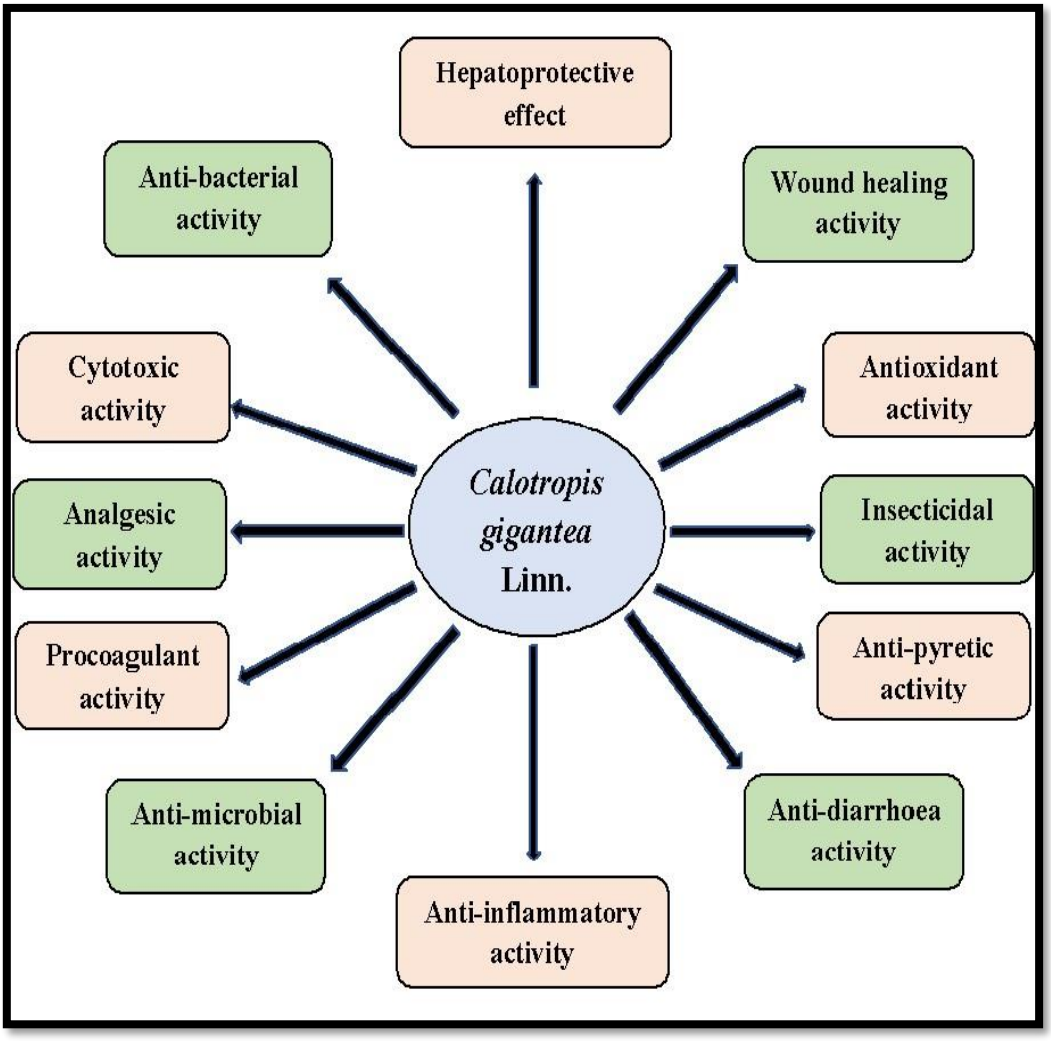


**Fig no.3:** Medicinal properties of C. gigantea Linn[13]

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**Table.5**. Traditional uses of Calotropis gigantea [4]

| Plant part | Traditional use | Reference |
|---|---|---|
| Whole plant | Treatment of bronchial asthma | Shankara, 1979 |
| | Treatment of cholera | Jain and Tarafder, 1970 |
| | Treatment of convulsions | |
| | Treatment of pneumonia | |
| | Treatment of ringworm infection | |
| | Treatment of small pox infection | |
| | Treatment of toothache | |
| | Treatment of epilepsy | |
| | Treatment of fever | Pal et al., 1999; Kumar et al., 2003 |
| | Treatment of leprosy | Iyengar et al., 1986 |
| | As purgative | Deka et al., 1984 |
| | Treatment of rheumatism | Subramaniam, 1999; Katiyar and Kolhe, 2000-2001 |
| | As wound healer | Singh and Pandy, 1980 |
| Flower | As antirabic | Mishra and Naquvi, 1995 |
| | Treatment of asthma | Jha, 2001 |
| | Treatment of catarrh | Yoganarasimhan et al., 1982 |
| | Treatment of cold | Ahluwalia, 1968; Raj and Patel, 1978; Kapoor and Kapoor, 1980; Singh et al., 1998 |
| | Treatment of cough | Suresh et al., 1995; Verma et al., 1995; Kothari and Londhe, 1999 |
| | As digestive | Banerjee and Banerjee, 1986 |
| | Treatment of dog bite infection | Girach et al., 1998 |
| | Treatment of inflammation and tumours | Tiwari and Majumder, 1996 |
| | Treatment of mental disorder | Upadhye et al., 1994, 1997; Borthakur et al., 1996; Katewa et al., 2003 |
| | Treatment of snake bite infection | Natarajan et al., 1999 |
| | Treatment of tuberculosis | Topno and Ghosh, 1999 |
| | As wound healer | Reddy et al., 1988; Rao et al., 2000 |
| Fruit | Treatment of leucoderma | Iyengar et al., 1986 |
| Seed | Treatment of earache | Banerjee, 1999 |
| | Treatment of cold, cough and chest pain | |
| | Treatment of blood clots | Chelvan, 1998 |
| | Treatment of body pain and fractures | Rao and Jamir, 1990 |
| | Treatment of eye inflammation | Sudhakar and Rao, 1985; Singh and Maheshwari, |

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| | | |
|---|---|---|
| | | 1994; Singh, 2000-2001 |
| | Treatment of tonsillitis | Basak, 1997 |
| | Treatment of insect bite infection | Rosakutty et al., 1999 |
| | Treatment of malaria | Maikhuri and Gangwar, 1993 |
| Leave | Treatment of pneumonia | Girach et al., 1997 |
| | Treatment of stomach pain | Brahma and Boissya, 1996 |
| | As vermicide | Tarafder, 1984 |
| Aerial part | Treatment of congestion and asthma | Kshirsagar et al., 2003 |
| | Treatment of toothache, cold, cough and chest pain | Banerjee, 1999 |
| Latex | Treatment of abortion | Natarajan et al., 1999 |
| | As anthelmintic | Iyengar et al., 1986 |
| | As irritant | Kapoor and Kapoor, 1980 |
| Wood | Treatment of asthma | Shah, 1982 |
| | Treatment of bleeding | Dash and Mishra, 1999 |
| | Treatment of enlargement of liver | Gogoi and Borthakur, 2001 |
| | As expectorant | Iyengar et al., 1986 |
| | Treatment of joint pain | Iman et al., 1997 |
| | Increase breast milk | Saren et al., 1999 |
| | Treatment of jaundice | Yadav and Patil, 2001 |
| | Treatment of leprosy | Shah and Joshi, 1971 |
| | Treatment of migraine | Hemadri and Rao, 1990 |
| | Mother and child health care | Goel and Rajendran, 1999 |
| | Treatment of piles | Nayak et al., 2004 |
| | Treatment of swelling | Maheshwari et al., 1986 |
| | Treatment of toothache | Shah, 1982 |
| Root | Antidote in snake venom | Murthy et al., 1986 |
| | Antidote to rat bite | Barua et al., 1999 |
| | Treatment of cancer | Singh, 2000-2001 |
| | Treatment of cuts and boils | Kumar et al., 2003 |
| | As diaphoretic | Kapoor and Kapoor, 1980 |
| | Treatment of diarrhoea | Nayak et al., 2004 |
| | Treatment of dog bite infection | Topno and Ghosh, 1999; Rao and Jamir, 1990 |
| | Treatment of dysentery | Shah and Gopal, 1982 |
| | Treatment of joint pain | Iman et al., 1997 |
| | Treatment of leprosy and eczema | Banerjee and Banerjee, 1986 |
| | Treatment of malaria | Kshirsagar et al., 2003 |

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| | | |
|---|---|---|
| | Treatment of menstrual disorders | Rao et al., 1999 |
| | Treatment of skin diseases | Jamir, 1990 |
| | Treatment of worms infection | Shah et al., 1983 |
| | Treatment of ulcer | Deka et al., 1984 |
| | As carminative | |
| Stem | Treatment of epilepsy | Jain and Sikarwar, 1998 |

- **Pharmacological activity of Calotropis gigantea**

1. **Anti-inflammatory Activity of Calotropis gigantea Linn.**

   The ethanolic extract Calotropis gigantea showed significant anti – inflammatory activity, suggesting that it predominantly inhibits the release of inflammatory mediators. However, animal study and other studies are necessary to identify and isolate the active constituents responsible for its anti –inflammatory activity and also there is a need to elucidate its mechanism/s of anti – inflammatory action.[11]

2. **Anticancer activity of Calotropis gigantea**

   Calotropis gigantea Cardenolides isolated from the root bark of C. gigantea exhibited cytotoxic activity against A549 and HeLa human cancer cells [30]. Results of this study indicated the following structure–activity relationships: i) Compounds with six-membered ring sugar groups (Figure 2) showed significantly stronger inhibitory activity, notably, 19-dihydrocalactin (IC50 = 0.03 and 0.05 μM), calactin (IC50 = 0.02 and 0.03 μM), calotoxin (IC50 = 0.07 and 0.09 μM), and calotropin (IC50 = 0.03 and 0.05 μM). Compounds with five-membered ring sugar groups such as 15β-hydroxycalactinic acid methyl ester, 15β-hydroxycalactinic acid ethyl ester and calactinic acid ethyl ester were inactive (IC50 > 10 μM). ii) A formyl (CHO) or methyl-hydroxyl (CH2OH) group at C-10 enhanced cytotoxicity of the compounds. 15β-Hydroxycalactin with a CHO group was much more cytotoxic than afroside which has a CH2 group. 19-Dihydrocalactin with a CH2OH group displayed similar potency as calactin with a CHO group. iii) The presence of 4'-OH or 16-OH groups decreased totoxicity. Calotoxin with an OH group at C-4' is three times less effective than calactin. 16α-Hydroxycalactin with an OH group at C-16 showed no cytotoxic activity.[12]

3. **Analgesic activity**

   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.

4. **The CNS activity** (analgesic activity) of alcoholic extract of peeled roots of C. gigantea was tested in albino rats. Analgesic activity was observed in Eddy's hot plate method and acetic acid induced writhings. Oral dose of the extract (250 and 500 mg/kg body weight) significantly delayed the paw licking time and the numbers of writhings were greatly reduced.

5. **Wound healing activity** Root bark extract of C. gigantea was investigated for wound healing activity in Wistar albino rats. The rats were topically treated with extract formulated in ointment for excision wound healing models and extract was given orally (100, 200 and 400 mg/kg dose) for incision wound healing models. The results indicate that extract treatment accelerated wound healing in rats. 12 The crude latex of C. gigantea was evaluated for its wound healing activity in albino rats using excision and incision wound models. At a dose of 200 mg/kg/day C. gigantea latex showed the significant wound healing activity as treated animals exhibit 83.42 % reduction in wound area when compared to controls which was 76.22 %. The extract treated wounds are found to epithelize faster as compared to controls

6. **Cytotoxic activity** The cardenolide glycosides collected from the root C. gigantea were reported to carry cytotoxic activity against several human and mouse cell lines. Calotropin, frugoside and 4'–O-β-Dglucopyransylfrugoside was found as the active principles.

   32 Two compounds (compound 1 and 2) isolated from ethanol extract of the roots of C. gigantea were reported to display inhibitory effects towards chronic myelogenous leukemia K562 and human gastric cancer SGC-7901 cell lines. Crude ethyl acetate extract from the flower of C. gigantea was reported to

inhibit the Ehrlich's ascites carcinoma in mice. Intraperitoneal injection (50, 100 and 200 mg/kg body weight) of the extract significantly decreases the viable tumour cells and body weight gain induced by the tumour burden and prolonged survival time.

The extract also restores the haematological and biochemical parameters (glucose, cholesterol, triglyceride, blood urea, ALP, SGPT and SGOT) that was altered during tumour progression, at 200 mg/kg body weight dose extract exhibits the best activity.

7. **Anti-diarrhoeal activity** The hydroalcoholic (50:50) extract of aerial part of C. gigantea was studied for anti-diarrhoeal activity against castor oil-induced-diarrhoea model in rats.

   The extract exhibited significant reductions in fecal output and frequency of droppings at the doses of 200 and 400 mg/kg body weight (intraperitoneal dose). The extract also showed significant inhibition in weight and volume of intestinal content.
8. **Anti-pyretic activity** Chitme et al. (2005) reported the anti-pyretic activity of the water:ethanol (50:50) extract of C. gigantea roots. Anti-pyretic activity was studied by using yeast and TAB (Typhoid) vaccineinduced pyrexia in Albino Swiss rats and rabbits.

   At the dose of 200 and 400 mg/kg body weight (intraperitoneal injection) extract significantly reduced the fever and body temperature was normalized.
9. **Insecticidal activity** 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. Methanol extract showed high insecticidal activity against T. castaneum followed by petroleum ether fraction and chloroform fraction.

   None of the sample showed fumigant toxicity.
10. **Anti-inflammatory Activity** Ethanol extract of C. gigantea was reported for the anti-inflammatory activity against carrageenan induced paw edema in Wistar albino rats. The oral administration of 400mg/kg of C. gigantea showed significant anti-inflammatory activity, the activity was found more than that of 100mg/kg of Ibuprofen
11. **Antioxidant activity** Leaves of C. gigantea were reported to carry antioxidant activity. The study reports the DPPH radical scavenging activity, reducing power activity and nitric oxide scavenging activity of the hydroalcohlic extract of C. gigantea leaves.

    Extract exhibited the maximum DPPH radical scavenging activity (85.17%) at 400µg/ml concentration. At 100µg/ml concentration extract showed 54.55% nitric oxide scavenging activity. Reducing power of the extract was found to increase with increasing the concentration of extract.
12. **Pregnancy interceptive properties** Different organic solvents of C. gigantea roots were reported to exhibit pregnancy interceptive activity in rats. The extract exhibited 100% pregnancy interceptive activity at a dose of 100 mg/kg. The extract also exhibited 100% efficacy at the dose of 12.5 mg/kg when administered in the Days 1-5 and 1-7 postcoitum schedules.
13. **Procoagulant activity** 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.

    Extract hydrolyses the subunits of fibrinogen, subunit Aa hydrolyzed first followed by Bb and g subunit. The crude extract hydrolysis crude fibrin clot strongly compared to trypsin and papain. Proteins present in the latex of C. gigantea are strongly proteolytic and responsible for procoagulant activity of C. gigantea.
14. **Hepatoprotective effects** Ethanol extract of stems of C. gigantea was reported for hepatoprotective activity in male Wistar rats against carbon tetrachloride induced liver damage. The extract resulted in significantly decreased of AST, ALT and lipid peroxide levels and showed effective protection of liver. The extract also protects the rats from oxidative damage [1]
15. **Procoagulant activity** : 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.

    Extract hydrolyses the subunits of fibrinogen, subunit Aa hydrolyzed first followed by Bb and g subunit. The crude extract hydrolysis crude fibrin clot strongly compared to trypsin and papain. Proteins present in the latex of C. gigantea are strongly proteolytic and responsible for procoagulant activity of C. gigantean

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**Table no.6 :** Other uses of Calotropis gigantean [2]

| S.No. | Activities | Parts Used |
|---|---|---|
| 1. | Arrow poison | Latex |
| 2. | Biocidal activity | Latex |
| 3. | Biogas and substitute for petroleum products | Whole plant |
| 4. | Brewing and to curdle milk | The bark and latex |
| 5. | Cleansing water | Leaves and its Saps |
| 6. | Energy plantation | Whole Plant |
| 7. | (1) **Fibers** | Bark, and the silky hairs from its seeds |
| 8. | Fodder | Young pods, Senescing leaves and flowers |
| 9. | Fungicidal, insecticidal properties | Whole Plant |
| 10. | Isomers Accumulation | Whole Plant |
| 12. | Latex or rubber | Latex |
| 13. | Leather tanning | Whole Plant |
| 14. | Manna like sugar and liquor (bar) | Sap |
| 15. | Manure, Pest repellant | Twigs and Leaves |
| 16. | Molluscicidal activity | Whole plant |
| 17. | Indicators of Heavy Metals | Leaf and Stem |
| 18. | Mosquitocidal potential | Whole plant Petroleum ether– acetone extract, |
| 19. | Poly aromatic hydrocarbon contamination | Leaves |
| 21. | Reclaiming salt lands | Whole plant |
| 22. | To cool the air around homes | Plantation of Calotropis |
| 23. | Substitute for paper | Leaves |

## II. CONCLUSION

This review has focused on the Pharmacological activity also C. gigantea has been traditionally used in the treatment of bronchitis, asthma, leprosy and eczema; pharmacologically reported to exhibit analgesic, antipyretic, larvicidal, antiarthritic, antidiabetic, antihyperlipidemic, antibacterial, anti-inflammatory and anticancer activities; phytochemically reported to contain about 4 major classes of chemical constituents such as cardenolides, oxypregnane -oligoglycosides, terpenoids and flavonoids. In recent years, ethnomedicinal studies received much attention as this brings to light the numerous little known and unknown medicinal virtues especially of plant origin. Pharmacological screenings of C. gigantea revealed its medicinal potential and represents as a valuable medicinal plant with several medicinal properties

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