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Review Article

The hidden powers of calotropis gigantea: Exploring its medicinal, toxic, and ecological dimensions

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ABSTRACT

Plants are used by peoples for the basis for medical treatments from ancient time and are still in routinely used as traditional medicine in practiced today. There are a huge number of plants having ultimate pharmacological action. In modernization and advancement in research new drug entities came into and play a role in management of any disorder and ailments. The modern allopathic medicine having serious complication at therapeutic dose. Traditional herbal medicines play a significant role in management and treatment of diseases and are getting noteworthy attention in worldwide health debates. Traditional systems of medicine persistently in practiced in many countries around the globe. There is a lot of reason that the people used herbal based medicine. Population augments, inadequate supply of drugs, cost of the treatment, and complicated reaction with the synthetic drugs and weakens of immunity system for infectious diseases have accent on the use of plant based medicines for the treatment of various ailments. There is large hierarchy of medicinal plant, calotropis gigantea having tremendous and ultimate pharmacological profile and used from ancient time in the treatment of various diseases.

1. Introduction

Calotropis gigantea Linn is part of the Asclepiadaceae family, which has about 2,000 species and more than 280 genera. The two common and closely related species are Calotropis procera (Ait) R.Br. and gigantea (Linn) R.Br. Calotropis gigantea, often known as madar, is a well-known medicinal herb that has long been used in the Siddha, Ayurvedic, and Unani traditions of medicine.. Different languages have different names for the medication Calotropis gigantea Linn. It is known as "Ashur" in Arabic, "Gigantic" or "Swallow wort" or "milk weed" in English, "Ak" or "Ark" or "Madar" in Hindi, "Arkagida" in Kannada, "Bukam" or "Dinesam" in Malayalam, and "Akanda" or "Lalakara& rui " in Marathi.[1]

C. gigantea is a widespread wasteland wildflower, sometimes known as huge milkweed. This plant is endemic to Bangladesh, Burma, China, India, Indonesia, Malaysia, Pakistan, the Philippines, Thailand, and Sri Lanka. C. gigantea is widely distributed in India and has ancient medicinal uses.[2]

Calotropis may grow wild up to 900 meters (msl) throughout the nation,[3] tolerates salt to a reasonably high degree, and likes disturbed soil. sandy soils with 300–400 mm of yearly mean rainfall. It swiftly establishes itself as a weed along damaged roadside margins, lagoon borders, and in overgrazed native grasslands thanks to its seeds that are distributed by the wind and animals. It prefers and often takes over places that have been abandoned for agriculture, particularly those with disturbed sandy soils and little rainfall. It's thought to be a sign of excessive farming.

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2. Geographical Distribution

It is native to India, China, and Malaysia, and it is found in these countries as well as Afghanistan, Eritrea, Ethiopia, Gambia, Ghana, Guinea-Bissau, India, Iran, Cameroon, Chad, Cote d'Ivoire, Democratic Republic of the Congo, and Egypt. Iraq, Israel, Kenya, Kuwait, Lebanon, Libya, Arab Jamahiriya, Mali, Mauritania, Morocco, Mozambique, Myanmar, Nepal, Niger, Nigeria, Oman, Pakistan, Saudi Arabia, Senegal, Sierra Leone, Somalia, Sudan, Syrian Arab Republic, Tanzania, Thailand, Uganda, United Arab emirates, Vietnam, Yemen, Republic of Zimbabwe, Exotic: Antigua and Barbuda, Argentina, Australia, Bahamas, Barbados, Bolivia, Brazil, Chile, Colombia, Cuba, Dominica, Dominican Republic, Ecuador, French Guiana, Grenada, Guadeloupe, Guatemala, Guyana, Haiti, Honduras, Jamaica, Martinique, Mexico, Montserrat, Netherlands Antilles, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Surinam, Trinidad and Tobago, Uruguay, Venezuela, and Virgin Islands (US).[4]

2.1. The chief features

1. The plant grows very well in a variety of soils and different environmental conditions
2. It does not require cultivation practices
3. It is one of the few plants not consumed by grazing animals[5]
4. It thrives on poor soils particularly where overgrazing has removed competition from native grasses[6]
5. Some times this plant is the only survivor in some areas, where nothing else grows[6]
6. It is drought tolerant and the pioneer vegetation in desert soil[6]
7. Presence of latex, extensively branched root system and thick leaves with waxy coverage are the xerophytic adaptations.[3]
8. Hence, it is distributed in tropical and subtropical area of the world and throughout India.[5]

3. Description of the Plant

3.1. Taxonomical classification[7]

1. Kingdom: Planatae
2. Subkingdom: Tracheobionta
3. Superdivision: Spermatophyta
4. Division: Magnoliophyta
5. Class: Dicotyledones
6. Sub class: Asteridae
7. Series: Bicarpellatae
8. Order: Gentianales
9. Family: Apocynaceae
10. Subfamily: Asclepidiaceae
11. Genus: Calotropis
12. Species: Calotropis gigantean

4. Vernacular Names

1. India (Sanskrit) Arka, Ganarupa, Mandara, Vasuka, Svetapushpa, sadapushpa, Alarka, Prata pass, (Hindi)Aak, Madar,(Kannada)Ekka, (Tamil and Malayalam) Erukku,(Telugu) Jilledi Puvvu.
2. Malaysia:- Remiga, rembega, kemengu.
3. English:-Crown flower, giant indian milkweed.
4. Indonesia: Bidhuri (sundanese, madurese), sidaguri (Javanese), Rubik (Aceh).
5. Philippines:- Kapal-Kapal (Tagalog).
6. Laos:- Kok may ,dok kap,dok hak.
7. Thailand:-Pothuean, paan thuean(northern), rak(central
8. French:- Faux arbre desoie, Mercure vegetal.

5. Botanical Description

5.1. Macroscopic features

Calotropis gigantea is a 1–5 m tall, upright shrub with several branches. The roots are round in shape.Twisted and often branching, measuring around 90 cm in length and 2.5–10 cm in diameter, the outside is yellowish gray while the inside is porcelain white. Root bark has a characteristically mucilaginous, bitter flavor and is short, curled, and seldom quilled into pieces that are 3-5 cm wide and 2-5 mm thick. Simple, opposite-decussate, subsessile, and extipulate leaves with a blade that is oblong to widely obovate, measuring 5-30 × 2.5-15.5.[8]

The flowers are complete, bisexual, bracteate, actinomorphic, pentamerous, hypogynous, and pedunculate. The corolla is gamopetalous, and the calyx has five sepals and a lobe that are briefly connected at the base. Fruits are subglobose to obliquely ovoid, simple, fleshy, and inflated. The seed has a smooth, white pulp and is around 6x 5 mm when squashed.[9]

5.2. Microscopic features

The transverse cut of the root reveals that the topmost substance is cork, which is organized in 15-20 layers of uniformly sized rectangular cells with no gap between them. The cortical region's cells are covered with a large number of starch granules. These cells have laticiferous tubes and a calcium oxalate rosette. They are composed of irregularly shaped parenchymatic cells.[10] The transverse slice through the midrib of leaves reveals a single-layered epidermis on both the upper and lower surfaces. The cuticle is thickly striated, and a small number of epidermal cells on both surfaces have elongated to form uniseriate, 2-3 celled trichomes. Most of the xylem is made up of tracheids and vessels.[11]

5.3. Traditional uses

Traditional Uses: Callotropis species is used to cure a variety of conditions, including bronchitis, pain, asthma, leprosy, ulcers, piles, spleen, tumors, liver, abdomen, and dyspepsia. It is also often used to treat rheumatism, indigestion, eczema, jaundice, and colds and fevers. Plant parts have been used to treat a variety of illnesses. For example, the stem has been used to treat skin conditions, intestinal worms, leprosy, and leucoderma; the roots have been used to treat leprosy, asthma, cough, elephantiasis, rheumatism, and diarrhea; latex and leaves have been used to treat swelling and joint pain; oil massage has been used to treat paralyzed areas; and Calotropis juice has been used to purge.

1. **In ayurveda:** The leaves of the C. gigantea plant are used to treat paralysis, swellings, and sporadic fevers.Asthma, catarrh, anorexia, helminthic infections, inflammations, and fever can all be treated with flowers.
   The plant's root bark is utilised for ascites, intestinal worms, helminth infections, and skin infections.
2. **In siddha:** The leaves of C. gigantea are used for the treatment of poisonous snake bites, periodic fever, vatha diseases, intestinal worms and ulcers. This plant's roots are thoroughly crushed and applied by vigorously rubbing over the bite region.
   Dental issues, rat bites, swellings, gonococcal arthritis, and other rheumatic ailments can all be treated using this plant's latex. The treatment of bronchial asthma with flowers.
3. **In unani :** The root bark powder is long time used in unani system for getting relief in diarrhoea and dysentery. The root of plant is carminative and useful in indigestion.

6. Chemical Constituents

6.1. Phytochemical studies

Calotropis have afforded several types of compounds such as Cardenolide, triterpinoids, alkaloids, resins, anthocyanins and proteolytic enzymes in latex, flavonoids, tannins, sterol ,saponins, cardiac glycosides. Flowers contain -terpenes, multiflorenol, and cyclisadol.[12]

1. **Leaves**:- The leaves contain mainly the amyrin acetate, ß-sitosterol, urosolic acid, cardenolides, calotropin, calotropagenin.
2. **Latex**:- The latex contains caoutchouc, calotropin,calotoxin 0.15%, calactin 0.15%, uscharin 0.45%, trypsin, voruscharin, uzarigenin,syriogenin and proceroside.[13]
3. **Flower**:- The flower contains the flavonoids,queretin-3- ratinoside, sterol, calactin, calotoxin, calotropagenin, calotropin, polysaccharides with D-arabinose, glucose, glucosamine and L-rhamnose. Flowers also containenzymes 3-proteinase and calotropain(protease).
   Other chemical constituents of C. gigantea flowers are lupeol, uscharin,proceroside, proceragenin(cardenolide),syriogenin, taraxast-20(30)-en-3-(4- methyl-3-pentenoate), 3-thiazoline cardenolide, gigantin,giganteol, isogiganteol, uscharidin, uzarigeninvoruscharin a-calotropeol, 3- epimoretenol, alactuceryl acetate an a-lactuceryl isovalerate[14]
4. **Bark**:-Root bark of Calotropis contains triterpenes, a new norditerpenyl ester, named Calotropterpenyl ester, and two unknownpentacyclic triterpinoids, namely calotropursenyl acetate and calotropfriedelenyl acetate, akundarol isovalerate, mundarol isovalerateand quercetin -3- rutinoside.[15,16]

7. Pharmacological Aspects

7.1. Antibacterial and antifungal potentials

Anhydrosophoradiol-3-acetate (compound 2) and 1Di-(2-ethylhexyl) phthalate (compound 1) have been separated using Calotropis gigantea ethyl acetate extract. As a positive control for the anti-bacterial activity investigation, Kanamycin and Nystatin disc were used. Materials were evaluated for antibacterial activity using 30, 60, and 90 μg/disc, and antifungal activity using 100, 200, and 400 μg/disc. In comparison to gram positive (Bacillus subtilis, Staphylococcus aureus, and Sarcina lutea) and gram negative (Shigella sonnei, Escherchia coli, Shigella shiga, and Shigella dysenteriae) bacteria, the 1Di-(2-ethylhexyl) phthalate (Compound 1) displayed greater effectiveness. Compound 2 had medium efficacy against Staphylococcus aureus, S. lutea, and E. Coli, whereas Compound 1 was inert against B. megaterium. Compound 2 had the lowest MIC at 64 μg/ml against S. aureus, whereas Compound 1 demonstrated the lowest MIC at 32 μg/ml against B. subtilis and S. lutea. Compound 1 shows action against A. flavus, whereas the test extract for antifungal activity produces a zone of inhibition ranging from 7 to 15 mm against A. fumigates and A. flavus. Compound 2 shows no action at all.[17] In contrast, the ethanolic extract of C. gigantea had strong antibacterial action in the 8–11 mm range[18] when tested against E. coli, Salmonella typhi, Pseudomonas aeruginosa, Vibrio cholerae, and Staphylococcus aureus.Thirteen Calotropis procera-silver nanoparticles were created by combining 3% latex extract with 3% silver nitrate solution. X-ray diffraction, UV-visible spectrophotometer, transmission electron microscopy, and fourier transform infrared spectroscopy were used to characterize the silver nanoparticles. The silver nanoparticles were tested against pathogenic fungus (Aspergillus terreus, Candida albicans, and Trichophyton

rubrum) as well as bacteria (Pseudomnas aeruginosa, Escherichia coli, and Serratia sp.). The antifungal and antibacterial properties of the silver nanoparticles are potent. By lowering the silver ions (Ag+ to Ag0), the silver nanoparticle demonstrates its significant antibacterial ability.[19]

7.2. Anti-diarrheal effect

Dried latex similar to phenylbutazone and atropine produced a marked decrease in defecation frequency and severity of diarrhea in 80% castor oil treated rats. For detail evaluation anti-diarrheal activity of C. procera latex different parameters were used like intestinal transit time, castor oil-induced fluid accumulation (enteropooling) and electrolyte concentration in intestinal fluid. The dried latex showed 27-37 % reduction in intestinal transit when compared to castor oil treated and normal animals. Unlike atropine dried latex of C. Procera inhibits castor oil induced enteropooling significantly. However the dry latex did not alter the electrolyte balance in the intestinal fluid when compared to castor oil-treated rats.[20]

Whereas the ethanolic root extract of C. gigantea used to study the anti-diarrheal potential. 100 mg/kg, 200 mg/kg and 400 mg/kg doses of extract were used. The 200 and 400 mg/kg dose showed appreciable anti-diarrheal activity.[21]

The 70% hydroethanolic extract of C. procera (CP) and C. gigantea (CG) leaves were used for castor oil induced diarrhea model for the study. The extract reduced the number of fecal boluses and improved the severity of the diarrhea condition. Dose dependant increase in latent period also observed. The CP showed a more prominent effect than the CG extract with reference to loperamide.[22]

7.3. Anti-pyretic activity

Chitme et al. (2005) reported the anti-pyreticactivity of the water:ethanol (50:50) extract of C.gigantea roots. Anti-pyretic activity was studiedby using yeast and TAB (Typhoid) vaccineinducedpyrexia in Albino Swiss rats and rabbits. At thedose of 200 and 400 mg/kg body weight (intraperitoneal injection) extract significantlyreduced the fever and body temperature was normalized.[23]

7.4. Anti-inflammatory activity

Calotropis gigantea's anti-inflammatory properties were shown via the use of the albumin denaturation procedure. The test drug's percentage inhibition of denaturation was seen to be similar to that of Ibuprofen (85.71%), suggesting a noteworthy anti-inflammatory effect.[24]

7.5. Hair growing activity

Hibiscus rosa sinensis (HRSF), Calotropis gigantea, and polyherbal formulation (HCF) inCombining the two plants was intended to show how they affected the commencement and encouragement of hair development in albino rats. The study's findings and observations were contrasted with those of minoxidil. Calotropis gigantea had some potential efficacy for hair growth, but not as much as other treatments.[25]

8. Anti-Convulsant and Sedative Activity

To study anti-convulsant and sedative activity in mouse the latex proteins of Calotropis procera were used. The convulsions were induced by pentylenetetrazol, Pilocarpine and strychnine for the anti-convulsion activity and the pentobarbital induced sleep model used for the sedative potential determination. The plant extract does not show significant effects on Pilocarpine and strychnine induced convulsion when compared with standards. The plant extract showed significant effect in pentylenetetrazol induced seizures model the extract showed at high dose (50 or 100 mg/kg), the extract proteins showed central depressant property.[26]

For the evaluation of anticonvulsant, sedative and muscle relaxant activity the ethanol extract of Calotropis gigantea was orally administered to the experimental animal. Strychnine and maximal electroshock induced convulsion models were used for the study. Actophotometer and Rota rod apparatus were used for the evaluation of sedative actions. The extract treated animals showed significant anticonvulsant activity against maximal electroshock induced convulsion, but no marked effect were observed against strychnine model. The extract showed significantly muscle relaxant activity and decrease in motor coordination in mice reported.[27]

8.1. 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.[28]

The crude latex of C. gigantea was evaluated for itswound healing activity in albino ratsusing 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.[29]

9. Anti-Convulsant and Sedative Activity

The latex proteins of Calotropis procera were used to investigate the anti-convulsant and sedative effects on mice.

The pentobarbital-induced sleep model was utilized to determine the sedative potential, and the convulsions were caused by pentylenetetrazol, pilocarpine, and strychnine for the anti-convulsion activity. When compared to standards, the plant extract had no discernible impact on convulsions generated by strychnine and pilocarpine. In the pentylenetetrazol-induced seizures paradigm, the plant extract significantly affected the animals. At high doses (50 or 100 mg/kg), the extract's proteins demonstrated central depressive properties.[30]

The experimental animal was given an oral ethanol extract of Calotropis gigantea to assess its anticonvulsant, sedative, and muscle relaxant properties. The research employed maximum electroshock generated convulsion models and strychnine. The Rota rod device and actophotometer were used to assess the sedative effects. The mice administered with the extract exhibited noteworthy anticonvulsant efficacy against the maximum electroshock-induced convulsion; however, no discernible impact was seen against the strychnine model. In mice, the extract drastically reduced motor coordination and exhibited muscle relaxant action.[31]

9.1. Anti-malarial activity

Petroleum ether, chloroform, and ethyl acetate were used to fractionate the ethanolic extracts of Calotropis procera leaves, in that order. The extract was tested against brine shrimp larvae and also in a bioassay for anti-malarial parasites. There was anti-malarial action in the extract.[32]

9.2. Insecticidal activity

The fumigant toxicity, residual film toxicity, and repelling properties of the root bark methanol extract of Calotropis gigantea and its petroleum ether and chloroform soluble fractions against many larval and adult stages of Tribolium castaneum. Methanol extract and its petroleum ether and chloroform fractions demonstrated insecticidal efficacy in residual film toxicity. The methanol extract exhibited the greatest level of toxicity or insecticidal action, as seen by its lowest LD50 values against several adult and larval instars. Methanol extract was the most hazardous component on T. castaneum, followed by petroleum ether fraction and chloroform fraction. Test sample fumigant toxicity was not discovered. Methanol extracts, as well as their chloroform and petroleum ether soluble fractions, were repellent to Tribolium castaneum in a mild to moderate range in the treated filter paper repellency test.[33]

9.3. Antivenom activity

The efficacy of Calotropis gigantea's methanolic extract in reducing the lethality, necrotizing activity, edema, and hemorrhagic activity of Vipera russelli's venom was assessed. The fatal effects of 2LD50 and 3LD50 of venom in mice were successfully negated by oral administration of extract at 200 and 400 mg/kg (in-vivo neutralization). The plant extract at 100, 200, and 400 mg/kg successfully neutralized the 2LD50 and 3LD50 of venom in in vitro experiments. It was also shown that the production of necrosis and hemorrhage was effectively inhibited. Plant extract had a significant antinecrotic effect at dosages of 200 and 400 mg/kg. At 60, 120, 180, and 240 minutes, the impact of methanolic extract on edema brought on by snake venom was investigated. At 240 minutes, plant extract at doses of 200 mg/kg and 400 mg/kg demonstrated significant anti-inflammatory action; this impact was comparable to that of the standard antivenom.[34,35]

9.4. Anti-Hyperglycemic effect

Hypoglycemic activity of C. Gigantea leaves extract was studied, diabetes induced by standard drug streptozotocin. The extract administered for 21 days it lowered the Total Cholesterol (TC), Triglycerides (TG), Very Low Density Lipoprotein (VLDL), Low Density Lipoprotein (LDL) and enhance cardio protective High Density Lipoprotein (HDL) level in treated animals. STZ treated animal showed increases in kidney weight due to proliferation of glomerular cell while extract treated animal showed decreases in kidney weight near to normal value. Urea and creatinine level significantly reduced in extract and STZ treated animal. Extract treated animal prevent elevation of tissue lipid in diabetic animal. Histopathological study showed prominent effects of extract treated animal when compared to control groups.[36]

The hydro alcoholic extract of Calotropis procera leaves was used for the study. Extract at a dose of 300 and 600 mg/kg/day, insulin (6U, s.c) or metformin (500 mg/kg/day) were administered to streptozotocin induced diabetes rats for four weeks. Result showed significant decreased in food intake in the group receiving extract (300mg/kg/day). Whereas group treated with 600 mg/kg/day showed decreases in food intake only in the first week of the study when compared with diabetic control. The animals treated with extract at 300 and 600 mg/kg showed significantly reduced in uric acid, ALT and AST level when compared with the diabetic control group, and increases in creatinine, total cholesterol and triglycerides. The extract showed significantly increased in adipose tissue and Soleus muscle relative mass, but decrease relative mass of the kidney when compared with the diabetic control group.[37]

Hypoglycaemic activity of chloroform extracts of Calotropis gigantea leaf and flower 10, 20 and 50 mg/kg were evaluated in Streptozotocin induced diabetic rats and compared with glibenclamide. The leaves and flower extracts were effective in lowering serum glucose levels in normal rats. Improvement in oral glucose tolerance was also registered by treatment with test drug. The administration of leaf and flower extracts to streptozotocin induced diabetic

rats showed a significant reduction in serum glucose levels.[38]

9.5. Analgesic activity

Calotropis gigantea flower alcohol extract was given orally to mice in chemical and thermal models to investigate the plant's analgesic properties. At dosages of 250 and 500 mg/kg, respectively, there was an inhibition of 20.97% and 43.0% in the number of writhes in the acetic acid-induced writhing test. The paw-licking period was prolonged while using the hot plate approach. After 30 minutes of dosage administration, the analgesic impact was seen, and it peaked after 90 minutes.[39]

9.6. Anti-Ulcer activity

The hydro alcoholic and chloroform extract of Calotropis procera stem bark was used for evaluation of anti-ulcer and anti-inflammatory activity. The carragennan-induced paw oedema model used for anti-inflammatory activity and ulcer induced by aspirin and ethanol at for evaluation of anti-ulcer activity in albino rats. The extract treated animals showed significant activity when compared to standard drugs. The anti-ulcer activity of extract was proved by histopathological examination.[40]

The chloroform and ethanol extract of Calotropis gigantea flowers used for the evaluation of anti-ulcer and anti-inflammatory activity. The carrageenan-induced paw oedema and cotton pellet induced granuloma model used for the study of anti-inflammatory activity. The aspirin and ranitidine used for the study of anti-ulcer activity. The extract significantly reduced rat paw oedema, dry weight granuloma and both the extract treated group significantly protect from pyloric ligation and aspirin induced gastric ulcers.[41]

9.7. Vasodilatation activity

Calotropis gigantea latex extract was studied in the green frog (Rana hexadactyla) for Vasodilatation effect. The diluted crude extract with distilled water in 1:10 and 1: 100 concentrations produces percentage increase in the cardiac output. Higher dilution factor increase the cardiac output 66% where as 1:10 produces 50% cardiac output. This reveals that the latex produces vasodilatation effect at fixed dose concentration.[42]

9.8. Anti-inflammatory activity

Calotropis gigantea's anti-inflammatory properties were shown via the use of the albumin denaturation procedure. The percentage of denaturation inhibition that the test medication generated was similar to that of ibuprofen (85.71%), suggesting that the test drug had a significant anti-inflammatory effect.[43]

9.9. Hepatoprotective activity

Acetaminophen induced hepatotoxicity models were used to evaluate hepatoprotective activity of leaf extracts of Calotropis gigantea in various solvents viz. petroleum ether, acetone, chloroform and methanol in increasing polarity. Chloroform and methanolic extract showed very significant reduction in SGPT level whereas, methanolic extract and Silymarin showed very significant reduction in SGOT level. The methanolic and chloroform extract of leaves showed significant hepatoprotective activity. However, acetone and petroleum ether extracts showed either no reduction or very slight reduction in various liver enzymes.[44]

9.10. Antiasthmatic activity

When ova albumin (OVA) was used to produce asthma, Calotropis gigantea demonstrated anti-asthmatic action. OVA was used to challenge and sensitize rats. Calotropis gigantea was discovered to have an influence on various body cells, enzymes, and histopathological alterations at doses of 100, 200, and 400 mg/kg p.o. In bronchoalveolar lavage fluid, Calotropis gigantea at 200 and 400 mg/kg significantly inhibited the numbers of neutrophils, lymphocytes, eosinophils, and total leukocytes ($P<0.05$). These findings indicate that because of the plant's anti-inflammatory, antilipoxygenase, and antioxidant properties, it may prove to be a useful therapeutic medication for the treatment of asthma.[45]

9.11. Toxicity

When used orally in excess of the recommended dosage, nausea, vomiting, and diarrhea occur. Extended higher dosages damage the gut and produce burning micturition and headaches[46,47] It may cause an abortion in expectant mothers and harm their lungs and liver.

10. Conclusion

the different Calotropis gigantea Linn components. Plant materials, such as roots, bark, leaves, flowers, and milk, are used traditionally to treat a variety of people. This review endeavors to compile the morphological description, medicinal applications referenced in the Unani medical system, ethnopharmacological reports, and all pharmacological investigations carried out on the plant, including its phytochemistry. These results support the use of plants in conventional medicine and provide a foundation for further research into the pharmacological and therapeutic properties of the plant.

11. Source of Funding

None.

12. Conflict of Interest

None.

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