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PHARMACOLOGICAL PERSPECTIVES OF *CALOTROPIS GIGANTEA* (ASCLEPIADACEAE)

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ABSTRACT: *Calotropis gigantea*, belonging to the family of Asclepiadaceae. The plant has the antimicrobial activity, antioxidant activity, analgesic activity, anti-pyretic activity, insecticidal activity, cytotoxicity activity, hepatoprotective activity, purgative properties and wound healing activity. The present paper is an attempt to provide a detailed botanical description, classification, phytochemical and various pharmacological activity study of the plant.

INTRODUCTION: Herbal medicines have been used from the earliest times to the present day. Herbal plants are an effective source of traditional & modern medicines, useful for primary health care. From pre-historic times to the modern era in many parts of the world, plants, animals and other natural objects have a profound influence on the 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, fiber, fertilizer, fuel and in every other way [1]. Today, traditional medical practice has been recognized by the world health organization (WHO) as a building block of primary healthcare. But it emphasizes the fact that safety should be the overriding criterion in the selection of herbal remedies for use in healthcare [2]. *Calotropis gigantea*, belonging to the family of Asclepiadaceae in the plant kingdom, is the well-known plants throughout the tropical world and they are native to the tropical and subtropical parts of Asia and Africa [3].

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Classification:

Kingdom: Plantae
Subkingdom: Tracheobionta
Superdivision: Spermatophyta
Division: Magnoliophyta
Class: Magnoliopsida
Order: Gentianales
Family: Asclepiadaceae
Genus: Calotropis
Species: *C. gigantea*

These plants are commonly known in English as Giant Milk Weeds or Swallow-worts. This species is one of the special classes of plants that can avoid or repel the grazing animals [4]. The roots and leaves of *C. gigantea* are used traditionally for the treatment of abdominal, tumors boils, skin diseases, wound, insect bites. A literature review showed that *Calotropis gigantea* contained cardenolide, glucosides, a nonprotein, amino acid, flavonoids, and steroids. *C. gigantea* in small dose is also useful in the treatment of cold, cough, asthma inflammatory diseases and loss of digestive and analgesic property of *C. Gigantea* [5-6]. Milky sap is used in the treatment of boils, scabies, burns, bruises, cuts, sores, stopping the blood, and wound healing; leaves are used in chest congestion and cardiovascular conditions. The roots and barks of *C. gigantea* are in use for paralysis, fits, epilepsy,

and convulsions in children. Shoot, leaf, roots flowers and latex extracts are reported to have antibacterial and antifungal properties by researchers. [7].

Ecology: *Calotropis* is drought resistant, salt tolerant to a relatively high degree, grows wild up to 900 meters (msl) throughout the country [8] and prefers disturbed sandy soils with mean annual rainfall: 300-400 mm. Through its wind and animal-dispersed seeds, it quickly becomes established as a weed along degraded roadsides, lagoon edges and in overgrazed native pastures. It has a preference for and is often dominant in areas of abandoned cultivation especially disturbed sandy soils and low rainfall. It is assumed to be an indicator of over-cultivation.

FIG. 1: WHOLE PLANT OF *CALOTROPIS GIGANTEA*

Morphology: A tall shrub reaching 2.4-3 m. high; bark yellowish white, furrowed; branches stout, terete, more or less covered (especially the younger ones) with fine appressed cottony pubescence. Leaves 10-20 by 3.8-10 cm, sessile, or nearly so, elliptic-oblong or obovate-oblong, acute, thick, glaucous-green. Clothed beneath and more or less above with fine cottony tomentum; base narrow, cordate, sometimes amplexicaul.

Flowers inodorous, purplish or white, 3.5-5 cm. diam., in umbellate lateral cymes; peduncles from between the petioles, 5.9 cm. long, dilated at the base; pedicels much longer than the flowers, covered with cotton wool; buds ovoid. 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 corona 1.3cm. long by 5 mm. Broad in the middle, shorter than the column, the back much curved towards the column above the obtuse spur, pubescent on the slightly thickened margin, the apex rounded (not bifid) 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 [9].

Chemical Constitutes: Chemical investigation of this plant has shown the presence of cardiac glycosides, saponins, flavonoids, steroids, terpenoids [10]. Cardenolide calotropin [11], α-amyrin, β-amyrin, taraxasterol, β- sitosterol, α-amyrin methylbutazone, β- amyrin methylbutazone, α-amyrin acetate, β-amyrin acetate, taraxasteryl acetate, lupeol acetate B, gigantursenyl acetate A, gigantursenyl acetate B [12-13]. flavonol glycoside, akundarol, uscharidin, calotropin, frugoside,

calotroposides A to G [14] are responsible for many of its activities. The following cardenolides are also described in the literature: calactin, calotoxin, calotropagenin, proceroside, syriogenine, uscharidin, uscharin, uzarigenin, and voruscharin [15-17]. Flavonoids, triterpenoids [18], alkaloids, steroids, glycosides, saponins, terpenes, enzymes, alcohol, resin, fatty acids and esters of calotropeols [19], volatile long chain fatty acids, glycosides and proteases [20] have been isolated from the various parts of the plant *Calotropis gigantea*.

Pharmacological Profile:

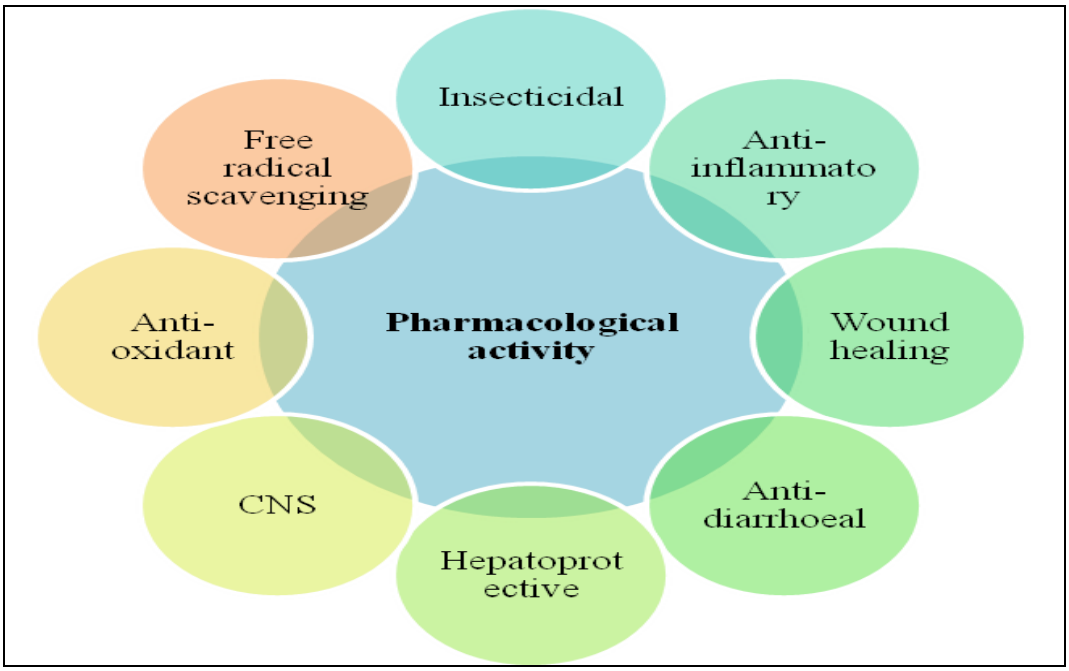

FIG. 2: SOME PHARMACOLOGICAL ACTIVITY OF *CALOTROPIS GIGANTEA*

Anti-Diarrhoeal Activity: The anti-diarrheal effect of hydroalcoholic (50:50) extract of aerial part of *Calotropis gigantea* was studied against castor oil-induced-diarrhea model in rats. The gastrointestinal transit rate was expressed as the percentage of the longest distance traversed by the charcoal divided by the total length of the small intestine. The weight and volume of intestinal content induced by castor oil were studied by enteropooling method [21].

Hepatoprotective Activity: Ethanol extract of stems of *C. gigantea* was reported for hepato-protective 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 the liver. The extract also protects the rats from oxidative damage [22]. In another study, methanolic extract of *C. gigantea* leaf having good hepatoprotective activity in dose-dependent manner against CCl_4 induced hepatotoxicity in rats [23].

Wound Healing Activity: Wound healing activity of this plant was studied in root bark. The effects of *Calotropis gigantea* root bark on wound healing activity in rats was investigated by excision, incision, and dead space wound healing models. The percentage of wound closure; epithelization time, hydroxyproline content and scar area on complete epithelization were measured. Application of *Calotropis gigantea* in excision wound model increased the percentage of wound contraction. Scar area and epithelization time were found to be decreased. In incision wound and dead space wound breaking strength of wounds and hydroxyproline was increased [24].

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 samples showed fumigant toxicity [25].

Anti-inflammatory: 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 400 mg/kg of *Calotropis gigantea* showed significant anti-inflammatory activity; the activity was found more than that of 100mg/kg of Ibuprofen [26]. In another study, the anti-inflammatory activity was evaluated using carrageenin-induced kaolin-induced rat paw edema for acute and cotton-pellet granuloma, adjuvant-induced arthritis model for chronic inflammation. Antipyretic activity was carried out using yeast induced pyresis method [27].

CNS Activity: Ameeta Argal *et al.*, was studied the alcoholic extract of peeled roots of *Calotropis gigantea* R.Br. (Asclepiadaceae) was tested orally in albino rats at the dose level of 250 and 500 mg/kg body weight for CNS activity [28].

Antioxidant Activity: Chloroform extracts of *Calotropis gigantea* leaf and flower on free radical scavenging activity, and lipid profile in streptozotocin-induced diabetic rats was investigated. The lipid peroxidation, superoxide dismutase, and catalase were measured in liver homogenate. Serum glutamic pyruvic transaminase, serum glutamic oxaloacetic transaminase, alkaline phosphatase, and lipid profile were measured in blood serum [29].

Free Radical Scavenging Activity: The ethanolic extracts of leaf and latex of *Calotropis gingantea* (Asciepadiacea) were tested of free radical Scavenging activity using 1,1 Diphenyl Picryl hydrazyl radical. The latex extracts of *C. gigeantea* (10 mg/ml) exhibited the greater capacity to scavenge DPPH radicals whereas leaf extract showed moderate free radical scavenging activity[30].

CONCLUSION: It is observed from various studies that the *Calotropis gigantea* have some pharmaceuticals and medicinal property and according to this it is effective in the treatment of a number of diseases. Future research on sacred basil should be emphasized for control of various diseases.

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CONFLICT OF INTEREST: Nil

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