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A review article on Pharmacognostic, Phytochemical, And Pharmacological Evaluation of Selaginella Bryopteris and Calotropis gigantean

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I. INTRODUCTION:

Herbal preparations have been used for a long time as medicinal, prophylactic, and health-promoting agents all over the world. Sanjeevni (Selaginella bryopterisL.) selaeagnaceae, a one-of-a-kind and extremely valuable plant, has attracted international attention due to its therapeutic and miraculous restoration potential. S. bryopterisis an anitrogenfixing thorny deciduous plant endemic to Europe and Asia that grows in colder climates. It has been introduced in a number of countries. It is employed as a key source ingredient in local tablets to treat spermatorrhoea, venereal disorders, constipation, indigestion, colitis, and urinary ailments in patients in India (diuretic). It's also used to treat comatose individuals and reduce the body temperature of those who have a fever. It has robust vegetative reproduction and a strong, complex root structure with nitrogen-fixing ability. It is a hardy herb that is both drought and cold-resilient, making it excellent for land restoration and farmstead protection. This herb has been often used in oriental traditional medicine to cure unconscious patients as well as lower body temperature in patients with fever. Recent studies are now underway to further understand and support S. bryopteristraditional usage. So far, S. bryopterishas been associated with a wide range of pharmacological actions, like anti-stress cell death, relief from heatstroke and the burning sensation during urination, memory enhancement, anti-hyperglycemic activity, relief from stomach aches, and anti-depressant activity.

The current study describes the current and ancient medical uses of S. bryopteris, as well as relevant scientific investigations into its medicinal and pharmacological properties.

Historical Background and Botanical Description

Sanjeevani, in botanical language, is also known as S. bryopteris(Figure 1). It is known for its remarkable renaissance capabilities. According to the Ramayana, Ravana flung a formidable weapon at Lakshmana (Lord Rama's brother), who had murdered his eldest son Indrajit, according to the Ramayana. Hanuman sought guidance from Sushena, the Lankan Imperial Physician. Sushena requested that Hanuman run to the Dronagiri Hills and collect four plants: Sanjeevani was one of those four plants.The great traditional knowledge of S. bryopteris herb to cure many ailments has been properly described in the Charaka Samhita and Sushruta.

Selaginella contains sweet, spicy, bitter, and frigid qualities and is related to the liver, stomach, and lung meridians in traditional Chinese medicine. S. bryopterisis a poikilohydric lithophyte that may be found all over the mountains. This plant is sold in various regions of India for its peculiar characteristics, mostly in pilgrimage destinations such as Rishikesh, Haridwar, and Varanasi. It's called "punjemariam" or "hathazori" in Unani.

These possess dichotomously branching stems, little leaves that are alternating, opposite, simple, one-veined, and occasionally two sizes, and ligule-like scales (early deciduous). Selaginella is a creeping plant with small scale-like leaves on branched stems that also produce roots.

The plants have two types of spores: megaspores and microspores, and all microphyll and sporophyll have ligules, which are scale-like outgrowths towards the base of the upper surface.

Each microphyll has a branching vascular trace, which is unusual for lycopods. Roots grow on wiry rhizophores that emerge from stem forks. Sporangia are borne in fertile leaf axils (sporophylls). Selaginella's life cycle comprises microsporangia, megasporangia, and other forms.

Microspores are microscopic and abundant, whereas megaspores are large and come in groups of four per megasporangium. The

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megaspore is where the gametophyte grows. S. bryopterishas n=10 chromosomes. The months of July to September are the most fertile for S. bryopteris.

Physiological and Biochemical Processes of S. Bryopteris

The resurrection plant has biochemical, morphological, physiological, and genetic mechanisms that allow it to sustain harsh desiccation. During dehydration and rehydration, the plants undergo metabolic alterations. The majorities of proteins produced during dehydration are found in chloroplasts and perform vital roles in photosynthetic structure preservation and recovery in resurrection species.

During this period, net photosynthesis is limited, PSII has higher photochemical efficiency, and dark respiration continues even at 10% relative water content, but bursts following rehydration, necessitating protective measures. Proteome analysis of detached fronds indicates that transport, targeting, and degradation proteins are variably expressed during the desiccation phase, with minimal difference in electrolyte leakage among dehydrated and rehydrated fronds. The plant solely performs respiration, with a decrease in Fv/Fm ratios and fluorescence after rehydration, which appears to be a physiological benefit of this resurrection plant. Residual oxygen species, proline lipid peroxidation, deposition, and antioxidative enzymes, such as ascorbate peroxidase, catalase, and superoxide dismutase, as well as soluble acid invertase, were enhanced, despite a slight decrease in chlorophyll content and a reduction in sucrose and starch content.

The plant exhibits 100% recovery following rehydration, even in the presence of photo inhibitory or thermal damage to PSII, indicating its drought resistance. The hydrated condition boosts intermediate of processes such as glycolysis, gluconeogenesis, and the tricarboxylic acid cycle, as well as antioxidant vanillate, sugar alcohols, sugar acids, and polyunsaturated fatty acids.

Nitrogen-rich and nucleotide catabolism materials (e.g., allantoin), UV-protective molecules such as 3-(3-hydroxyphenyl) propionate, apigenin, naringenin, and γ –glutamyl amino acids such as citrulline, and lipids such as choline phosphate are formed much more during dry state conditions, and play a key role in cell membrane hydration and maintenance.

Researchers reported 500 protein spots in dried Selaginella bryopterisplants using two dimensional gel electrophoresis, nine of which showed substantial changes in abundance, eight of which were up-regulated, and one of which was downregulated, presumably by conserving photosynthetic function.

Phytochemistry

Some significant secondary plant metabolites such as alkaloids, phenol, flavonoids, tannins, saponins, and terpenoids were identified in the chemical analysis of S. bryopteris(triterpene, steroid). Biflavonoid is the most important secondary metabolite. S. bryopteris(L.), a desiccation tolerant Indian resurrection and medicinal herb, is abundant in flavonoids.

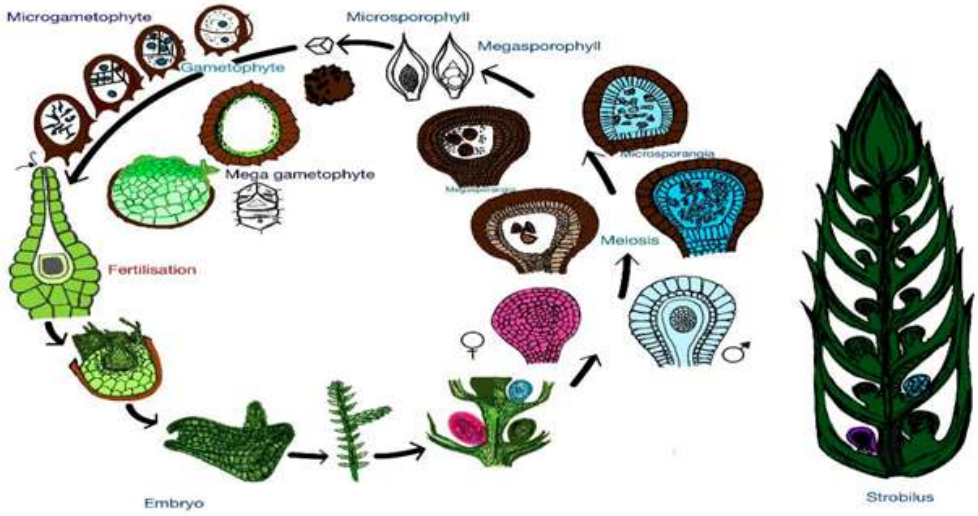

Fig 02. :- : Life cycle of S. bryopteris

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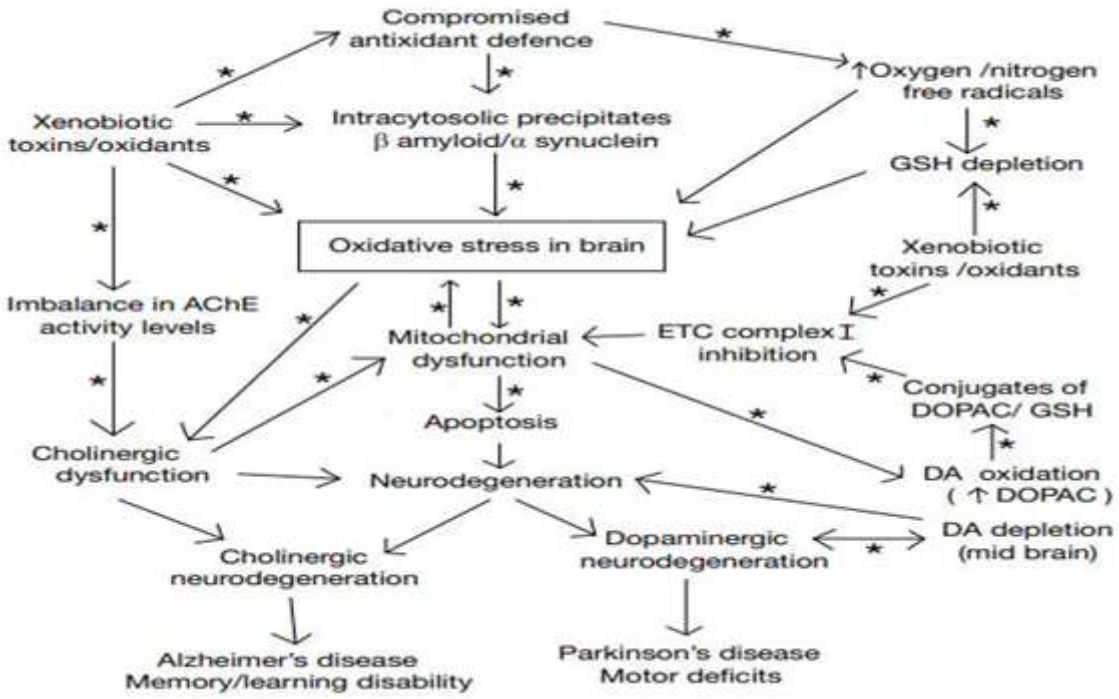

Fig. 03. : - The role of oxidative stress and mitochondrial dysfunction in the evolution of neurodegenerative illnesses (*-Therapeutic targets for phytochemical action) is depicted in this diagram

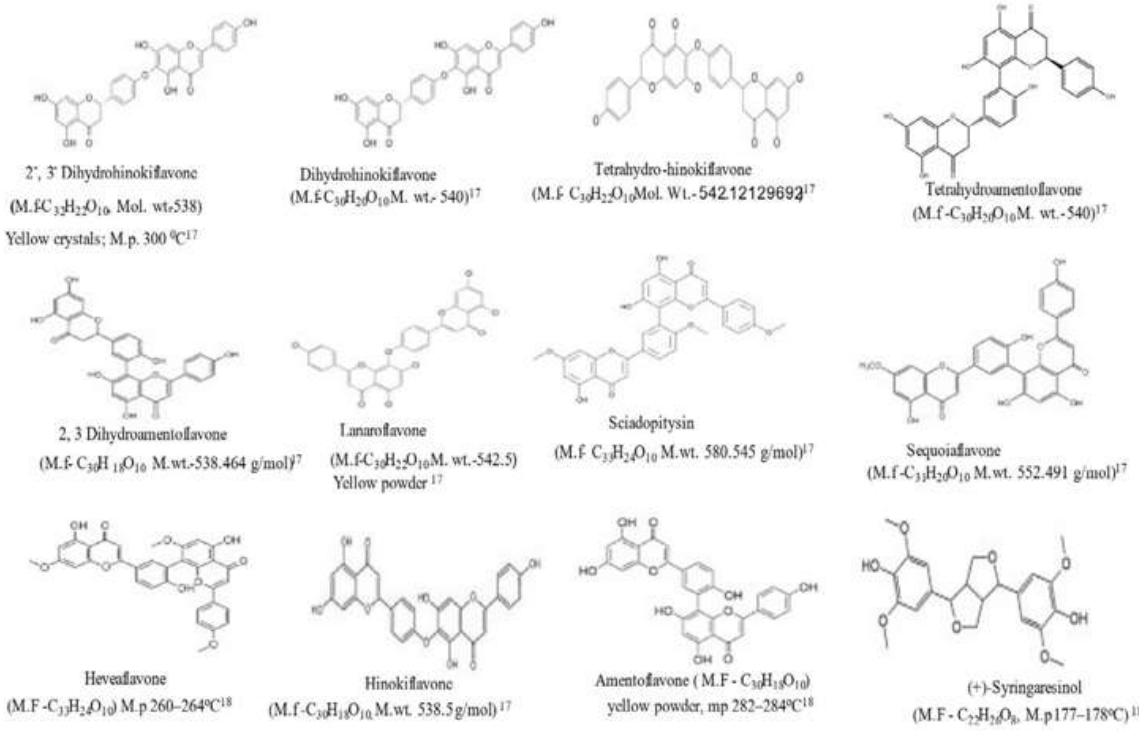

Fig. 04. :- Physical properties of various compounds of S. bryopteris.

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Plant 02. Calotropis Gigantea Linn. **Plant 03. Leaf & Flower of Calotropis Gigantea Linn**

Arka (Calotropis gigantea), an effective Ayurvedic medicine, has been used in this country since ancient times. It is mentioned by the earliest Hindu authors, and the ancient name of the plant that appears in Vediyesc literature is Arka, which refers to the shape of leaves that was used in sacrifical rites. Calotropis gigantea (Linn.) R.Br. and Calotropis procera(Ait.) R.Br. these are two common species of Calotropis described by Sanskrit authors. C. gigantea or giant milk weed, is a common wasteland weed found in Bangladesh, Burma, China, India, Indonesia, Malaysia, Pakistan, Philippines, Thailand, and Sri Lanka. C. gigantea is commonly found in India and is used for a variety of medicinal purposes in the conventional medical system. C. gigantea has recently been scientifically documented for a variety of medicinal properties, including analgesic, antimicrobial, and cytotoxic activity in the flowers.

Anti-diarrhoeal activity4- 6, hypoglycemic activity 7, antibacterial activity 8-10, and antioxidant activity have been identified for the plant's leaves and areal sections whereas roots have been confirmed for anti-pyretic effect. Calotropis gigantea has been the subject of many reviews to date wherein various pharmacological studies on Calotropis gigantea conducted in the last few years were included in this study in addition it is attempted to summarize recent works and current developments in the field of modern phytomedicine regarding Calotropis gigantea's phytochemistry and pharmacology from various parts of the world.

Botanical Description of Calotropis gigantea

A tall shrub with a back that is yellowish white and furrowed and branches are stout, terete, and covered in fine appressed cottony pubescence (especially the younger ones). Leaves are sessile, elliptic-oblong or obovate-oblong, acute, thick, glaucous-green, clothed beneath and more or less above with fine cottony tomentum; base narrow, cordate. Flowers are odorless and purplish or white in color. Sepals 6 by 4 mm, ovate, acute, cottony; calyx divided to the base. Corolla flower that grows in the 2 cm or more in length; lobes 1.3-1.6 cm long, deltoid-ovate, subacute, revolute, and bent with age; corona's 1 lobe 3cm long by 5 mm wide, pubescent on the slightly thickened margin, with a rounded apex and two obtuse auricles below. 9-10 cm green follicle is long, broad, thick, fleshy, and ventricose. Brown coma, multiple seeds, 6 by 5 mm, widely ovate, flattened closely margined, minutely tomentose long up to 2.5-3.2 cm.

Description of the Plant (Taxonomical classification)

Kingdom: Planatae
Subkingdom: Tracheobionta
Superdivision: Spermatophyta
Division: Magnoliophyta
Class: Dicotyledones
Sub class: Asteridae
Series: Bicarpellatae
Order: Gentianales
Family: Apocynaceae
Subfamily: Asclepidiaceae
Genus: Calotropis
Species: Calotropis gigantea

Vernacular Names

Hindi: Akand, Ark, Madar
Sanskrit: Arka, Aditya, Mandara
Marathi: Akand, RuiPart used: Leaves, root, root bark, latex, stem bark, flowers.

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Morphology- Calotropis gigantea

1.	**Root**	Simple, branched, woody at the base and covered with a fissured; corky bark; branches somewhat succulent and densely white tomentose; early glabrescent. All parts of the plant exude white latex when cut or broken
2.	**Leaves**	Opposite-decussate, simple, subsessile, exstipulate; blade oblong, obovate to broadly obovate, 5-30 X 2.5-15.5 cm, apex abruptly and shortly acuminate to apiculate, base cordate, margins entire, succulent, white tomentose when young, later glabrescent and glacouse.
3.	**Flowers**	Bracteate, complete, bisexual, action-morphic, pentamerous, hypogynous, pedicellate, pedicel 1-3 cm long
4.	**Calyx**	Sepal 5, Polysepalous, 5 lobed, shortly united at the base, glabrescent, quincuncial aestivation
5.	**Androeciu m**	Stamens five, gynandrous, another dithecous, coherent
6.	**Bark & Branches**	The bark is thick, rough and corky and a yellow-brown colour; twigs are green and fleshy and may have a covering of tomentum (white fur like hairs)
7.	**Fruit**	A simple, fleshy, inflated, subglobose to obliquely ovoid follicle up to 10 cm or more in diameter.
8.	**Seeds**	Many, small, flat, obovate, 6 × 5 mm, compressed with silky white pappus, 3 cm or more long.

Chemical Constituents

Phytochemical studies on Calotropis have afforded several types of compounds such as Cardenolide, triterpenoids, alkaloids, resins, anthocyanins and proteolytic enzymes in latex, flavonoids,tannins, sterol, saponins, cardiac glycosides.

But the leaves ofCalotropis gigantea five major chemicals:

- Methyl β-carboline-1-carboxylate
- (+)-dehydrovomifoliol
- Pleurone
- Calotropagenin and Calotoxin
- Cardenolide, triterpenoids, alkaloids, resins, anthocyanins, proteolytic enzymes in latex, flavonoids, tannins, sterols, saponins and cardiac glycoside a few of the compounds discovered through phytochemical research on Calotropis. Terpenes, multiflorenol, and cyclisadol are found in flowers

Medicinal Uses

Different extracts of the plant show different properties.

- Root and bark of Calotropis gigantea shows wound healing activity.
- The cardenolide glycosides collected from the root Calotropisgigantea were reported to carry cytotoxic activity against severalhuman and mouse cell lines.
- The hydroalcoholic (50:50) extract of aerial part of Calotropis gigantea exhibits anti-diarrheal activity. Water: ethanol (50:50) extract of roots shows anti-pyretic activity.
- Methanol extract of roots shows good insecticidal activity.
- Ethanol extract of Calotropis gigantea shows anti-inflammatoryactivity.
- Leaves of Calotropis gigantea carry profound amounts ofantioxidants.
- The leaves have anti-asthmatic property.
- The crushed leaves are warmed and used as a poultice on sores, burns, headaches and rheumatic pains. The powdered flowersare valued for treating coughs, colds and asthma.
- Aqueous extract of latex possesses antibacterial activity against

Traditional Uses

A fine fiber is obtained from the bark of the Calotropis plant, whichis used for making textiles, fishing nets and bowstrings. The matureseed pods contain large quantity of floss, which is used to stuffpillows or mixed with other fibers to make cloth. Similarly, the twigsare used as chewsticks for cleaning the teeth. The juice of the plant isused making a yellow dye and tanning.

REFERENCE:

[1]. Anbarashan M and Padmavthy A (2010), has been studied about the “Ethno-medicinal plants” in five sacred groves in Cuddalore district, Tamilnadu, India, Ethnobotanical leaflets.

International Journal of Pharmaceutical Research and Applications
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[2]. Biella CdA, et al (2008). Has studied about the "Evaluation of immunomodulatory and anti-inflammatory effects and phytochemical screening of Alternanthera tenella Colla (Amaranthaceae) aqueous extracts".
[3]. Galor SW and Benzie IFF (2011), has found the various results related to Herbal Medicine, an Introduction to Its History, Usage, Regulation, Current Trends, and Research Needs. Herbal Medicine: Biomolecular and Clinical Aspects.
[4]. Nagori K, Sharma M, et al, (2011), all are studied in the various field of General Awareness on Allopathic, Ayurvedic and Homeopathic system of medicine in Chhattisgarh, India, Int J Pharm Sci.
[5]. Dakshayani SS, Marulasiddeshwara MB, Kumar S (2019), were studied about the activity of the plant and state that "antimicrobial, anticoagulant and antiplatelet activities of green synthesized silvernanoparticles using Selaginella (Sanjeevini) plant extract".
[6]. Paswan SK, Gautam A, Verma P (2017) has studied about the"The Indian Magical Herb 'Sanjeevni' (Selaginella bryopteris L.)" and conclude that a Promising Anti-inflammatory Phytomedicine for the Treatment of Patients with InflammatorySkin Diseases.
[7]. Pal LC, Gautam A, Pande V (2022) has complete their study in "Anticancer property of Selaginella bryopteris (L.) Bak, against hepatocellular carcinoma in vitro and in vivo".
[8]. Pandey V, Ranjan S, Deeba F, et al (2010) has describe about"Desiccation-induced physiological and biochemical changes in resurrection plant,Selaginella bryopteris. J Plant Physiol".
[9]. Yobi A, Wone BW, Xu W et al (2013), studied about"Metabolomic profiling in Selaginella lepidophylla at various hydration states provides new insights into the mechanistic basis of desiccation tolerance". Mol Plant.
[10]. Challabathula D, Puthur JT, et al (2016) has studied about "Surviving metabolic arrest: photosynthesis during desiccation and rehydration in resurrection plants".
[11]. Sarkar S, Chakraverty R, Ghosh A et al (2014), has been studied about the'Calotropis Gigantea Linn. - A Complete BusketOf Indian Traditional Medicine".
[12]. Kirtikar KR and Basu BD et al (1999), studied about "The Indian Medicinal Plants".
[13]. Habib MR, Karim MR et al (2013), has been found about the"Effect of anhydrosophoradiol-3-acetate of Calotropis gigantea (Linn.) flower as antitumoric agent against Ehrlich's ascites carcinoma in mice". Pharmacological Reports.
[14]. Ali R, Amin KMY, Ahmad G, et al (July 2010) was find out the "Verious Efficacy of post Beekhe Madar (Calotropis gigantea) root bark in experimentally induced diarrhoea". Hippocratic journal of Unani medicine.
[15]. Ali R, Jahan N, Amin KMY et al (2012), studied about "An Anti-diarrhoeal activity of Calotropis gigantean root bark in experimental animals". Journal of research in Unani medicine.
[16]. Chitme HR, Chandra R, Kaushik S et al (2004), Studies on anti-diarrhoeal activity of Calotropis gigantea r. br. in experimental animals.
[17]. Rathod NR, Chitme HR, Irchhaiya R, Chandra R et al (2011), studied about"The Hypoglycemic effect of Calotropis gigantea Linn. leaves and flowers in streptozotocin-induced diabetic rats". Oman Medical Journal.
[18]. Kumar G, Karthik L, Bhaskara Rao KVet al (2012), studied aboutAntimicrobial screening and brine shrimp lethality bioassay of Calotropis gigantea (Fam: Asclepiadaceae).
[19]. Seniya C, Trivedia SS, Verma SK. Antibacterial efficacy and phytochemical analysis of organic solvent extracts of Calotropis gigantean. Chem. Pharm. Res. 2011; 3(6): 330-336.
[20]. Joseph B, George J and Jeevitha MV et al (2013). Studied about "Pharmacological and Biological Overview on Calotropis Gigantean: A Comprehensive Review." Int Res J Pharm Appl Sci
[21]. Kanchan T et al (2016). Studied about "Calotropis gigantea." Wilderness.
[22]. Kedare SB and Singh RP et al (2011). Studied about "Genesis and Development of DPPH Method of Antioxidant Assay."
[23]. Kumar G, Karthik L and Rao KVB et al (2010) has identify about "Antimicrobial

Activity of Latex of Calotropis gigantea Against Pathogenic Microorganisms-An in vitro Study." Pharmacologyonline.

[24]. Kumar G et al (2010) studied about "Antibacterial Activity of Aqueous Extract of Calotropis gigantean Leaves–An in vitro Study." Int J Pharm Sci Rev.

[25]. Kumar G, Karthik L and Rao KVB et al (2011), has reviewed that "A Review on Pharmacological and Phytochemical Profile of Calotropis gigantea Linn."Pharmacologyonline.