

Phytochemical Analysis and Anti-viral Potential of Calotropis Procera in Rabies

Akanksha B. Pawar, Sakshi R. Dalavi, Archana T. Chaskar

Sahakar Maharshi Kisanrao Varal Patil College of Pharmacy, Nighoj, Ahilyanagar

Abstract: *Calotropis procera* is a species of flowering plant belonging to the family Apocynaceae. It is native to Northern and Tropical Africa, Western Asia, South Asia, and Indochina (mainland Southeast Asia). The plant typically grows to a height of 1.8 to 2.4 meters (approximately 6 to 8 feet). The bark and sap are used to make drinks and to thicken milk. The multipotent biological activities of *Calotropis Procera*, including anti-inflammatory, antioxidant, anticancer, wound healing, and broad spectrum antimicrobial properties, have been extensively studied. The plant is known to contain a variety of phytoconstituents such as flavonoids, terpenoids, cardenolides, steroids, and oxy pregnanes. It possesses numerous medicinal properties that act based on its active principles. The medicinal properties of *Calotropis procera* are well-documented in Ayurvedic medicine, where it is considered effective in the treatment of dog bites. *Calotropis procera* is believed to help neutralize rabies infection and promote recovery. Additionally, the latex of *Calotropis procera* is known to exhibit antimicrobial activity, playing a role in combating various bacterial, viral, and fungal infections. It possesses numerous medicinal properties that act based on its active principles.

The medicinal properties of *Calotropis procera* are in Ayurvedic medicine, where it is considered effective in the treatment of dog bites. According to Ayurvedic texts, *Calotropis procera* is believed to help neutralize rabies infection and promote recovery. Additionally, the latex of *Calotropis procera* is known to exhibit antiviral activity, playing a role in combating various bacterial, viral, and fungal infections. The reported human mortality due to rabies infection appears low, cultural beliefs, inadequate rabies diagnostic facilities, and limited public knowledge about the modes of transmission and prevention of the disease (Otolarin et al., 2015). Indigenous tribes across the world utilize this plant for the treatment of a wide range of ailments, including snake bites, body pain, asthma, epilepsy, cancer, skin diseases, and others. This review provides a comprehensive overview of the epidemiology, transmission, pathogenesis, recent advances in diagnosis, vaccination, and therapeutic approaches, along with appropriate prevention and control strategies.

Keywords: Rabies, *Calotropis Procera*, Ayurvedic medicine, antiviral potential, leaves

I. INTRODUCTION

Rabies is a dangerous disease found in over 150 countries, especially in Asia and Africa. It is caused by a virus that spreads from animals to people. Every year, it kills tens of thousands of people, and about 40% of them are children under 15 years old. Rabies is often ignored and doesn't get enough attention, even though it's a big health problem. Rabies infection usually starts with symptoms like a fever, headache, or feeling tired—similar to the flu. There may also be unclear signs affecting the nerves, like tingling or confusion. Once these symptoms appear, the disease is nearly always fatal. This disease is caused by viruses from the Lyssavirus group, which belong to a family called Rhabdoviridae. The main virus responsible for this disease in India is the Rabies virus (RABV). Rabies is usually spread through the bite or scratch of an infected animal. Rabies usually takes 4 to 8 weeks to show symptoms, but it can range from just 5 days to up to 7 years. If the bite is on the face, neck, or head—closer to the brain—it can take less time for symptoms to appear.



There are two main types of Rabies are:

1. Furious rabies (Encephalitic rabies): This is the most common type. It causes symptoms like aggression, confusion, fear of water, and sensitivity to light and sound . As it gets worse, it can lead to coma and death.
2. Dumb rabies (Paralytic rabies) :This happens in about 20% of cases. It causes muscles weakness and paralysis that slowly spreads. People with this type don't show aggression seen in furious rabies, but they eventually become unconscious or die due to the paralysis.

Both types are fatal once symptoms appear, but rabies can be prevented if treated right after being bitten.



AS of 2024, the World Health Organization (WHO) has prequalified only three human rabies vaccines for global use. These vaccines are considered safe and effective for pre-exposure and post-exposure prophylaxis (PEP). These three WHO prequalified rabies vaccine are:

1. RABIVAX-S – this vaccine manufactured by Serum institute of India Pvt.Ltd.
2. VAXiRab N – this vaccine manufactured by Zydus Lifesciences Limited.
3. VERORAB – this vaccine manufactured by Sanofi Pasteur.

Calotropis Procera: Since ancient times, people have sought remedies for their diseases by turning to nature. Medicinal plants have been known and used by humans throughout history. The recognition of the medicinal and economic value of these plants is increasing in both industrialized and developing countries to provide humanity with new medicines and remedies. *Calotropis Procera* is a perennial shrub belonging to the family Apocynaceae. It is widely distributed in tropical and sub-tropical regions of Asia, Africa, and the Americas. In Pakistan, it is commonly found in the plains of Punjab, where it grows abundantly along roadsides, in pastures, and in other disturbed habitats. Due to its diverse ethnobotanical and pharmacological applications, *C.procera* is considered a multipurpose plant with significant ecological and medicinal value. The plant is well known for producing large quantities of latex, which can be easily extracted from its green tissues when they are damaged. This high concentration of latex supports the theory that it serves as a defense mechanism against various threats, including viruses, fungi, and insects.

Calotris Procera, commonly known as *Arka* in Ayurveda and *Sodom apple* in English, is indeed a well-known medicinal plant in tradition Indian medicine, including Ayurveda, Siddha, and Unani systems. However, your claim that it is the only medicinal plant that provides complete relief in dog bites and that it destroys all types of bacterial, fungal, and viral infections needs to be clarified and placed in proper scientific and traditional context.





Fig no:2

Table no. 1 Botanical name of Calotropis Procera : (7,9)

Rank	Descriptions
Kingdom	Plantae- plants
Subkingdom	Tracheobionta – vascular plants
Superdivision	Spermatophyta –seed plants
Division	Magnoliophyta –dicotyledons
Subclass	Asreridae
Order	Gentianales
Family	Asclepiadaceae- Milkweed family
Genus	Calotropis R. Br.Calotropis

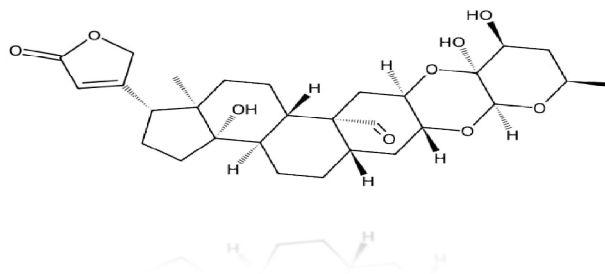
The latex, leaves, bark, and roots are used with caution due to their potent biological activity and toxicity .In dog bites and poisonous animal bites, it may be used topically or in formulations, but never as a standalone remedy. C. Procera is a perennial, evergreen shrub or soft-wooded tree that typically grows upto 2.5 meters in height, with a maximum height of around 6 meters. The stem is generally unbranched and simple, with a woody base covered in fissured, corky bark. When any part of the plant is cut or broken, it exudes, a white milky latex. The root system features prominent taproot that extends approximately 3 to 4 meters deep and is woody at the base (AI Sulaibi et.,2020). C. Procera contains wide range of bioactive phytochemicals, including alkaloids, flavonoids, calotoxin, cardiac glycosides (like calactin and uscharin), phenolics, saponins, steroids (phytosterols), tannins, and terpenoids. These compounds are found in various parts of the plant, such as the latex, leaves, roots, and seeds, and are responsible for its diverse medicinal properties.

The root bark of the plant was found to contain long-chain fatty acids, sterols, and resins. A water-based extract from the leaves gave a type of complex sugar called a polysaccharide. This polysaccharide was made up of several smaller sugar units, including D-glucose, D-arabinose, D-glucosamine, and L-rhamnose. Calotropis procera is a plant often used in traditional medicine. People in many local communities use parts of the plant — like its leaves, roots, and milky juice (latex) — to treat different health problems. In some places, it is believed to help fight rabies, a deadly disease caused by animal bites. Traditional healers may crush the plant parts or mix them with other herbs to make natural remedies. They believe these treatments can help protect or cure people after a dog or animal bite.

Chemical Constituent:

Calotoxin





Morphology of Calotropis Procera :

Parts

Leaves :



Fig No: 3

Descriptions

Calotropis procera, commonly known as Akra, Akanal, or Madar, is a plant whose leaves are used in traditional medicine to treat many health problems. People believe it helps with snakebites, sinus issues, rheumatism, mumps, body pain, and injuries. It is also used for jaundice, skin conditions like albinism, eczema, and leprosy, and is thought to act as a quick remedy for rabies. The leaves are often applied as a poultice to reduce pain and swelling. It may also help with migraines, fever, elephantiasis, asthma, cough, and joint problems.

Flower:



Fig No: 4



Roots :



Fig No: 5

The flowers of *Calotropis procera* are traditionally used in folk medicine. They are believed to help treat skin and gum infections, are used as a remedy for dysentery, and also serve as an antidote for scorpion bites.

The root of *Calotropis procera* is used in traditional medicine as a digestive aid and to help relieve body pain. It is also believed to be useful in treating malaria, eczema, leprosy, elephantiasis, asthma, cough, and rheumatism.

Method of Use of *Calotropis Procera* in Dog bite : According to Ayurvedic medical science, the latex of *Calotropis procera* is commonly used for medicinal purposes. It is typically applied topically to the site of a bite. In more severe cases, the latex is administered orally, mixed with black sesame powder and jaggery. This preparation is believed to provide quick relief to the patient and is also considered a natural antidote to the effects of the *Calotropis procera*-associated rabies virus.

Preparation for Rabies management:

A traditional knowledge holder has recommended a herbal preparation as a supportive treatment for managing symptoms associated with rabies. The remedy focuses on alleviating some of the disease symptoms through natural ingredients.

Disease symptoms addressed:

Fever
Hydrophobia (fear of water)
Headache
Excess salivation
Muscle spasm
Paralysis
Mental Confusion

Ingredients Used:

Madar (*Calotropis procera*) – 3 tender leaves
Jaggery (Gudd) – 5 grams

Preparation Method:

Crush the tender leaves of *Calotropis procera* along with 5 grams of jaggery to form a paste.



Dosage and Application:

Consume the prepared paste once in the first week. A second dose should be taken in the following (second) week.

Precautions:

Avoid intake of sour food items during the course of treatment..

Uses:

Uses of Calotropis procera:

1. Latex (milky liquid from the plant): Can be used to make renewable fuel and energy products. Contains 11–23% natural rubber.
2. Tannin or dye: The bark can be crushed to make a liquid that helps remove hair from animal hides and is used in leather tanning. It can also be used to make natural dyes.
3. Poison: The bark and latex are used as poisons on arrows and spears. The latex is harmful to the heart because it contains a toxic chemical called calotropin.

REFERENCES

- [1]. Rabies <https://share.google/3Xl2Nkib8vb9T4y9D>
- [2]. Rabies - StatPearls - NCBI Bookshelf <https://share.google/2gMnn9EahKbCkloy4>
- [3]. Recent updates on laboratory diagnosis of rabies from Indian journal of medical research by Ashwini M. A.; Pattanaik, Amrita; Mani, Reeta S. January 2024.
- [4]. PDF Rabies :an overview
- [5]. A review on Calotropis Procera its photochemistry and traditional uses from Big Data in Agriculture (BDA) by Hina Batool, Mumtaz Hussain, Mansoor Hameed.
- [6]. Phytochemistry of Calotropis procera and its traditional uses.
- [7]. Fin. Irjmet
- [8]. Calotropis procera significant role in dogs bite
- [9]. A mini review of Calotropis Procera and tapping its phytochemical and pharmacological potential by Satyabrata Kundu of the journal of phytopharmacology
- [10]. Calotropis Procera: A comprehensive review of its phytochemistry, ethnomedicinal uses, and pharmacological potential – ScienceDirect
- [11]. Calotropis Procera Significant Role in Dogs Bite <https://www.ijpsjournal.com/article/Calotropis+Procera+Significant+Role+in+Dogs+Bite>
- [12]. Ayurvedic aspect of rabies and its management <https://share.google/AabZ2hk9iyOgkEYCe>
- [13]. IJNRD2211235.pdf <https://share.google/vnrUz3zE9wxmaGeWX>
- [14]. Exploring the Potential of Calotropis procera in Pharmacological Approaches | IntechOpen <https://www.intechopen.com/chapters/88396#>
- [15]. 2bda2020-56-58.pdf <https://bigdatainagriculture.com/paper/issue2%202020/2bda2020-56-58.pdf>
- [16]. Calotropis procera - Wikipedia https://en.wikipedia.org/wiki/Calotropis_procera
- [17]. National Innovation Foundation-India <https://share.google/IkYnVzP25VkKgfQEP>
- [18]. Calotropis_procera.PDF https://apps.worldagroforestry.org/treedb/AFTPDFS/Calotropis_procera.PDF
- [19]. A review on phytochemical constituents and pharmacological potential of Calotropis procera - RSC Advances (RSC Publishing) <https://pubs.rsc.org/en/content/articlelanding/2021/ra/d1ra06703f>
- [20]. K. Chandra and U. N. Pandey, Some folk medicines of Singhbhum (Bihar), Sachitra Ayurveda, 1984, 37, 253 —357 Search PubMed.
- [21]. Calotropis Procera Significant Role in Dogs Bite <https://www.ijpsjournal.com/article/Calotropis+Procera+Significant+Role+in+Dogs+BiteEfficacy> and phytochemical analysis of latex of Calotropis procera against selected dermatophytes - PMC <https://share.google/u8tk0NDotFRpezN0w>

