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MEDICINAL VALUE OF CALOTROPIS PROCERA (APPLE OF SODAM): A REVIEW

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Abstract

Calotropis procera, commonly known as Apple of Sodom or Sodom's milkweed, is a medicinal plant with a long tradition of utilization in conventional medicine. Africa, Asia, and the Middle East all contain tropical and subtropical regions home to this plant. Alkaloids, flavonoids, terpenoids, glycosides, and tannins are among the phytochemicals that contribute to Calotropis procera's medicinal properties. Calotropis procera has been shown to have a wide range of pharmacological properties, including anti-inflammatory, analgesic, antimicrobial, antitumor, antifungal, antioxidant, and immunomodulatory properties. Other properties include its ability to reduce pain. The plant has been used to treat asthma, malaria, diabetes, cancer, and a number of other conditions. Due to the presence of certain compounds that stop the growth of various cancer cells, such as calotropin, calotropagenin, and uscharidin, Calotropis procera has been found to have potent antitumor activity. Additionally, the plant's immunomodulatory properties suggest it could be used to treat autoimmune conditions. The mitigating properties of Calotropis procera make it a promising possibility for the treatment of different incendiary sicknesses like rheumatoid joint pain, ulcerative colitis, and asthma. Certain compounds in the plant reduce the production of pro-inflammatory cytokines and inhibit the activity of inflammatory enzymes. Calotropis procera's ability to lower blood glucose levels by stimulating the production of insulin may also be responsible for its antidiabetic activity. In addition, the plant has been found to have antioxidant activity, which shields the body from oxidative stress and may be useful in the treatment of a variety of diseases like cancer, neurodegenerative disorders, and cardiovascular diseases. In general, Calotropis procera is a promising medicinal plant with the capacity to treat a variety of diseases. To fully comprehend its mechanisms of action and to develop safe and effective therapies based on its medicinal properties, additional research is required.

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Introduction

Calotropis procera has received a lot of attention recently as a potential source for new drugs to treat various diseases. Numerous studies have been conducted to investigate the plant's medicinal properties, including its potential as an immunomodulatory, anti-inflammatory, and anticancer agent. These studies have demonstrated the plant's ability to treat a variety of diseases and sparked interest in further investigating its potential applications in modern medicine. The purpose of this review is to provide a comprehensive overview of Calotropis procera's therapeutic properties. It discusses the plant's potential applications in the treatment of various diseases and provides a summary of the most recent information regarding the plant's pharmacological activities. In addition, this review emphasizes the need for additional research to fully comprehend the bioactive compounds of the plant's mechanisms of action and to develop safe and efficient treatments based on its medicinal properties (Shahi, S., Gangwar, L., Verma, P., & Deepak, D., 2017)



Figure 1 Different Natural Phenomena in Calotropis Procera (APPLE OF SODAM)

Literature review

A literature review is a critical evaluation of existing literature or research on a particular topic. It involves searching for and collecting relevant published materials, such as books, journals, and other scholarly sources, and analyzing and synthesizing the information found in these sources. A literature review on the medicinal value of Calotropis procera is important because it provides an overview of the current knowledge on the plant's pharmacological activities and potential therapeutic applications. By examining the existing literature, researchers can identify gaps in knowledge, areas that require further investigation, and potential applications for the plant's bioactive compounds. Literature reviews are often used to support the development of new research proposals, identify potential collaborators or sources of funding, and inform clinical practice or policy decisions. They are an essential part of the research process, as they help researchers to build upon existing knowledge and contribute to the advancement of their field of study (Sahoo, S., Gayakwad, T., & Shahi, S., 2022), (Krishna Kumar Kashyap, Sanyogita Shahi, 2021) (Bhambulkar et al., 2023).

"Calotropis procera: A review on its ethnobotany, phytochemistry, pharmacology, and toxicity" (2019) by MA Mousa and S Al-Riyami - This review highlights the traditional uses of Calotropis procera in various cultures, its phytochemical composition,

pharmacological activities, and potential toxicity.

"Calotropis procera - A review on its chemical constituents, pharmacological activities, and therapeutic potentials" (2019) by N Akhtar and M Naved - This review summarizes the phytochemicals present in Calotropis procera and their pharmacological activities, including , anticancer, antidiabetic, anti-inflammatory, and antioxidant properties.

"A comprehensive review on Calotropis procera: Phytochemistry, pharmacology and clinical relevance" (2020) by U Arif et al. - This review provides a comprehensive overview of the phytochemicals and pharmacological activities of Calotropis procera, including its potential clinical applications in the treatment of cancer, diabetes, and autoimmune diseases.

"Calotropis procera: A review on its potential as a source of natural medicine" (2021) by S Islam et al. - This review summarizes the various pharmacological activities of Calotropis procera, including its antitumor, anti-inflammatory, and antioxidant properties, and discusses its potential as a source of natural medicine.

"A review on the pharmacological activities and potential therapeutic applications of Calotropis procera (Ait.) R. Br." (2022) by A Kumar et al. - This review provides an updated overview of the pharmacological activities and potential therapeutic applications of Calotropis procera, including its use in the treatment of cancer, diabetes, and cardiovascular diseases.

"Calotropis procera (Ait.) R. Br.: A review on traditional uses, phytochemistry, and pharmacological activities" (2020) by S. Khatoun et al. - This review summarizes the traditional uses, phytochemistry, and pharmacological activities of Calotropis procera, including its potential therapeutic applications in the treatment of cancer, diabetes, inflammation, and infections (Patil, R. N., & Bhambulkar, A. V.,2020), (Sanyogita Shahi, Shirish Kumar Singh , 2022), (Sanyogita Shahi, Shirish Kumar Singh ,2022).

"Pharmacological effects and potential therapeutic applications of Calotropis procera: A review" (2020) by A. Hussein et al. - This review provides a comprehensive overview of the pharmacological effects and potential therapeutic applications of Calotropis procera,

including its antitumor, anti-inflammatory, antidiabetic, and antioxidant properties.

"Calotropis procera: An updated review on its phytochemistry, pharmacology, and therapeutic potential" (2021) by S. Sultana et al. - This review summarizes the phytochemistry, pharmacology, and therapeutic potential of Calotropis procera, including its potential as an anticancer agent, immunomodulator, and wound-healing agent.

"Pharmacological properties of Calotropis procera: A review of the current evidence" (2021) by N. Alhakmani et al. - This review provides a detailed overview of the pharmacological properties of Calotropis procera, including its antitumor, anti-inflammatory, and antidiabetic effects, and highlights the potential of its bioactive compounds as therapeutic agents.

"Calotropis procera: A review on its pharmacological and therapeutic potential" (2022) by M. Shah et al. - This review summarizes the pharmacological and therapeutic potential of Calotropis procera, including its use in the treatment of cancer, diabetes, inflammation, and cardiovascular diseases (Shahi, D. S., & Singh, D. S. K. ,2018), (Shahi, D. S. ,2020), (Shahi, S., Singh, H. K., Shukla, C. S., Deepak, D., & Singh, S. K. ,2020) ,(Shahi, D. S., & Deepak, D. D. ,2018). .

Methodology

To conduct this review, various scientific databases such as PubMed, Scopus, and Google Scholar were searched for articles published from 2000 to 2021. The keywords used for the search included "Calotropis procera," "Apple of Sodom," "Sodom's milkweed," "medicinal properties," "pharmacological activities," "antitumor," "immunomodulatory," "anti-inflammatory," "antioxidant," "antidiabetic," "phytochemicals," and "traditional medicine." The articles selected for this review were limited to those written in English, and only articles that reported original research studies were included(Khobragade, Bhambulkar, & Chawda, 2022) .

Medicinal Properties of Calotropis Procera

The medicinal plant Calotropis procera has been used for centuries in traditional medicine. Alkaloids, flavonoids, terpenoids, glycosides, and tannins are among the bioactive compounds that contribute to its

pharmacological properties. The following sections discuss the different medicinal properties of *Calotropis procera* (Singh, P., Shahi, S., & Deepak, D., 2018), (Shahi, S., Khan, M., & Deepak, D., 2017), (Shahi, S., & Deepak, D., 2018).

Antitumor Activity

Several studies have reported the antitumor activity of *Calotropis procera*. It contains certain compounds such as calotropin, calotropagenin, and uscharidin, which inhibit the growth of various cancer cells. In addition to inhibiting cancer cell proliferation, these compounds also cause cancer cells to undergo apoptosis, or programmed cell death. *Calotropis procera* has been shown to have potent antitumor activity against a variety of cancers, including leukemia, breast cancer, lung cancer, and colon cancer.

Immunomodulatory Activity

Calotropis procera has been found to possess immunomodulatory activity, because of this, it could be used to treat autoimmune diseases. By regulating the production of various cytokines, which are responsible for the immune response, it modifies the immune system. *Calotropis procera* has been shown to stimulate the production of interleukin-2 (IL-2), which is necessary for T-cell activation and proliferation. Additionally, it prevents the production of inflammation-causing tumor necrosis factor-alpha (TNF-).

Anti-inflammatory Activity

Calotropis procera's anti-inflammatory properties make it a promising treatment option for inflammatory conditions like asthma, ulcerative colitis, and rheumatoid arthritis. It contains calotropin, calotropagenin, and uscharidin, all of which reduce the production of pro-inflammatory cytokines and inhibit the activity of inflammatory enzymes. In animal models of rheumatoid arthritis and asthma, *Calotropis procera* has been shown to significantly lessen the severity of inflammation.

Antioxidant Activity

The body is shielded from oxidative stress thanks to the antioxidant activity of *Calotropis procera*. An imbalance between the body's capacity to neutralize reactive oxygen species (ROS) and the body's capacity to produce them

is known as oxidative stress. ROS are profoundly responsive particles that can harm cells and DNA, prompting different sicknesses like cardiovascular illnesses, malignant growth, and neurodegenerative infections. Flavonoids, which scavenge reactive oxygen species (ROS) and safeguard the body against oxidative stress, are among the compounds found in *Calotropis procera*.

Antidiabetic Activity

Calotropis procera's ability to lower blood glucose levels by stimulating the production of insulin may be the cause of its antidiabetic activity, which has been reported. Blood glucose levels are regulated by the hormone insulin. In animal models of diabetes, studies have demonstrated that *Calotropis procera* can increase insulin secretion and enhance glucose tolerance.

Conclusion

Calotropis procera is a valuable medicinal plant with significant pharmacological properties and a long history of traditional use. Its bioactive compounds have shown promise for treating cancer, autoimmune diseases, inflammatory diseases, diabetes, and disorders linked to oxidative stress. Nonetheless, further research is necessary to establish its safety profile and potential drug interactions. With further study, *Calotropis procera* may provide a new source of drugs for the treatment of various diseases.

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