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Screening Of Calotropis Procera Linn. For Its Phytochemicals

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Abstract

Herbal plants are essential for our daily lives and health and has been used in traditional medicines for a long time. The accessibility and fewer negative effects of herbal plants, has attributed to the popularity of the herbal plants. *Calotropis procera* Linn. is a well-known plant for its use in traditional medicine because of its many healing qualities that can treat a wide range of illnesses. In the present investigation, the leaves of *C. procera* was extracted in various solvents like Petroleum ether, chloroform and ethanol using successive solvent methods and distilled water was used as the control. These extracts were profiled for various phytochemicals. Numerous phytochemicals were identified in the different extracts of *C.procera* leaves at various intensities which included fatty acids, flavonoids, terpenoids, phenols, alkaloids, steroids, saponins, glycosides and terpenes. The presence of these phytochemicals confers a variety of therapeutic benefits in this plant like anti-inflammatory, anthelmintic, anticancer, antioxidant and antitumor properties, making it able to cure a variety of diseases and disorders, including asthma, colds, epilepsy, fever, indigestion, leprosy, piles, and skin diseases. Moreover, the plant holds much undiscovered medicinal values which needs to be brought out so that lead compounds from this plant can be used to design new drugs for combating emerging diseases in the future.

Key words: - ***Calotropis procera,*** **Phytochemicals**

Introduction

Calotropis procera Linn is a giant shrub belongs to the Apocyanaceae family and the genus has six species. The shrub has cottony, white hairs all over its branches. It also provides milky latex. Calotropis is a huge, bushy shrub with leaves that are decussate, obovate, coriaceous, auriculate, and have extra axillary, umbellate, panicle, purple corolla, and erect lobes (Ragasa *et al*.,2014). According to morphological research, the leaves are subsessile, measuring 6–15 cm by 4.5-8 cm, and can be broadly oval, ovate–oblong, elliptical, or obovate. They are pubescent while they are young and glabrous on both sides when they mature and has numerous medical uses is *C. procera* (Moustafa *et al*.,2010). Many possible medical uses exist for the plant's edible parts, including its latex, bark, flowers, leaves, and roots. This plant, often called "milkweed," is native to China, Malaysia, and India and can be found practically anywhere in the world. The target chemicals are present in nearly every section of *C. procera,* yet ecological considerations may affect a certain plant's relative distribution or total amount (Sharma *et al*.,2011). In addition to being used as an abortion aid in folk medicines, latex is a common wound-healing substance used by traditional healers. The existence of various significant classes of phytochemicals, such as glycosides, flavonoids, fatty acids, and triterpenoids, has been observed in the various species of the *Calotropis* genus with regard to secondary metabolites (Srivastava *et al*., 2015). Hesse and his coworkers in 1960, has isolated heart poisons, which are cardiac glycosides namely calotropin, calotoxin, calactin, uscharin, voruscharin and uschariding. According to Gupta *et al*., 1990, root powder of this plant is used by tribals to induce abortion in women and as an uterotonic since ancient period, which was later found to be due to the presence of compound calotropin in this plant. In the past, the pharmaceutical industry has depended heavily on naturally occurring components from plants and animals to provide lead compounds for the creation of innovative medications and treatments (Patel *et al*.,2014). The search for novel pharmacologically active compounds in natural resources such as plants, animals, and microorganisms has yielded several clinically useful drugs. Nonetheless, current research suggests that this plant has medicinal benefits. Thus, in order to shed light on the many little-known and undiscovered medicinal benefits of the plant leaves, the current study attempts to collect data on the phytochemical and biological activities of the extracts of this plant. According to Wadhwani *et al*.,2021, *C. procera* is a popular study material for scientists worldwide due to its pharmacological characteristics, which include anti-diabetic, anti-toxin, anti-hepatotoxin, antioxidant, and wound-healing capabilities. The latex of *C.procera* is

known to be more toxic than snake venom, still it is used in Ayurveda and has also attracted its wide application in traditional medicine.

Materials and Methods

Plant Collection and Extraction

The fresh leaves of the *Calotropis procera* plant were picked. The leaves were given a water flow and then left to air dry. The dried leaves were subjected to phytochemical evaluation using standard procedures. Successive solvent extraction was carried out in a soxhlet apparatus after the other. Petroleum ether, chloroform, ethanol, and distilled water were used in to extract about 25 g of powdered material. The solvent in the thimble was extracted until it became clear. Following each extraction, the extract was vacuum-dried at a temperature below 45ºC to remove the solvent. The yield percentages of distilled water extract, petroleum ether, ethanol, and chloroform were noted. Phytochemical evaluation was done using standard procedures. Until their biological activities were examined, the extracts were kept in a refrigerator at 4ºC. For approximately six hours, the 1 g of powdered *C. procera* leaves were maintained at 500°C in the muffle furnace after being weighed to determine the total amount of ash in the plant material.

Results and Discussion

Plants are capable of producing both primary and secondary metabolites that contain a variety of phytochemical components. A wide range of biological roles have been demonstrated for some of these bioactive components, including flavonoids, phenols, alkaloids, tannins, saponins, steroids, and carbohydrates(Gupta *et al*.,2000). Due to their therapeutic qualities, medicinal plants are being investigated as a potential alternative source of therapeutic chemicals. The various pharmacological effects that *C. procera* displays, such as its antibacterial, antioxidant, anti-inflammatory, cytotoxic, and analgesic qualities, are facilitated by phytochemicals (Kaur *et al*.,2021). Plant portion, extraction technique, and geographic location are a few examples of the variables that may affect the phytochemical content.

The plant's phytochemical parameter values can be utilised as markers for authenticity and to guarantee the quality of the drugs made. Studies have reported the presence of alkaloids, flavonoids, and tannins in *C. procera* (Sharma *et al.*,2011).Table 1 shows the phytochemical constituents in different solvent extracts of *C. procera*. The ethanol extract of the experimental plant leaves showed the presence of alkaloids, sugars, phenols, flavonoids, steroids, tannins. terpenoids and glycosides in which alkaloids, flavanoids, and steroids were more strongly expressed, while the highest intensity was shown by flavanoids (Table 1). Earlier research indicates that the ethanolic extract of the *C. procera* had flavonoids, glycosides, and sterols (Meena *et al*.,2011), which agrees with the present investigation. However saponins and fatty acids could not be detected in this extract. In the petroleum ether extract of leaves, alkaloids, phenols, steroids, tannins and glycosides could be detected, while sugars, flavonoids, terpenoids could not be detected (Table 1). In the chloroform extract of leaves only three phytochemicals could be detected, namely phenols, terpenoids and glycosides and distilled water extract could elute only saponins and tannins from leaves in this investigation (Table 1).The pharmacologically active ingredients found in medicinal plants have long been used in traditional medicine to treat a wide range of illnesses (Adebanjo *et al*., 1983). The present study showed notable quantities of pharmacologically significant phytochemicals in the ethanolic extract of *C. procera* leaves which provided the scientific foundation for the fact that this plant is used to treat a variety of ailments.

Table 1-Phytochemical profile of *C.procera* leaves

Phytochemicals	Petroleum ether extract	Chloroform extract	Ethanol extract	Distilled Water extract
Alkaloids	+	–	++	–
Sugars	–	–	+	–
Phenols	+	+	+	
Flavonoids	–	–	+++	–
Saponins	–	–	–	+
Steroids	+	–	++	–
Terpenoids	–	+	+	–
Tannins	+	–	+	+
Fatty acids	–	–	–	–
Glycosides	+	+	+	-

The residue that remains after burning plant material at a high temperature is referred to as the ash value. Ash values are crucial metrics for evaluating the quality and purity of plant-based medicines. Both the non-physiological (inorganic) and

physiological (organic) components of the plant material are included in total ash. *C. procera* leaf's total ash value represents the sample's total mineral composition. This plant had an overall ash content of 18.3%. There contains 1.6% of acid-insoluble ash and 1.9% of the ash is water-soluble. (Table 2).

Table 2-Showing ash content of leaves.

Type of ash	Ash value (%)
Total ash	**18.3**
Acid-insoluble ash	**1.6**
Water-soluble ash	**1.9**

One useful method for determining the presence of specific phytochemicals is to analyse the fluorescence of powdered *C. procera* leaves in various solvents. The *C. procera* leaf powder fluorescence intensity and colour were measured in each solvent. Table 3 shows the presence of specific fluorescent chemicals indicated by the green fluorescence of *C. procera* leaf ethanol extract when exposed to UV light. Certain flavonoid compounds found in plants can exhibit fluorescence under UV light. Flavonoids are a diverse group of phytochemicals known for their antioxidant and other biological activities (Gholamshahi *et al*.,2014). Flavonoids can emit fluorescence in various colors, including green. This investigation shows that the presence of secondary metabolites such as phenolics and flavonoids in the leaves of the experimental plant. However the precise fluorescent chemicals found in *C. procera* leaf powder can differ based on a number of variables, including plant genetics, extraction techniques, and ambient circumstances (Al-Rowaily *et al*.,2020). Further investigation of ethanolic leaf extract of this plant using chromatographic followed by spectroscopic analysis could further phytochemical characterize this medicinally important plant which can also lead to the discovery of lead compounds for the discovery of new drugs to combat emerging diseases.

Table 3 Showing fluorescence of *C.procera* leaves

Treatment	Under visible light	U.V. light (short wavelength; 254 nm)
Powder	Green	No change
Powder + 1N NaOH (aqueous)	Light green	Green
Powder + 1N NaOH (ethanolic)	Pale green	Light green
Powder + 1N HCl	Green	Green
Powder + 50% HNO_3	Brown	Green

Conclusion

Pharmacological screenings of *C.procera* have identified a number of phytochemical compounds, including terpenoids, carbohydrates, alkaloids, glycosides, tannins, flavonoids, phenols, quinones, and coumarins. Ethnomedicinal research has drawn a lot of interest recently since it has revealed many hidden and unknown health benefits, particularly those derived from plants. Consequently, this plant can be a useful medicinal plant in the future as it has a lot of therapeutic potential. Despite *C.procera* many medicinal uses, further research is still needed to standardize the phytochemicals and unidentified compounds in this plant, identify a new powerful molecule that can suppresses a variety of pathological disorders, and create a new class of drug therapies that will improve human health. Pharmacologists and researchers are currently looking for ways to incorporate natural sources into allopathic medications. In the future, *C.procera* leaves may aid in the creation of superior medications and pave the way for the manufacture of contemporary medications with fewer side effects. For that *C.procera* should be conserved to be used more therapeutically for which systemic research and development efforts should be made.

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