Competence in phytochemical investigation and pharmacological prospects of Curcuma caesia Roxb.

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Abstract

Large leaves are found on the annual herb Curcuma caesia Roxb. Rhizomes are grown for their rhizomes, which are utilized in traditional medicine. Fresh rhizomes have a strong camphoraceous odor. According to reports, the main components of the plant are camphor, ar-turmerone, (Z)-ocimene, ar-curcumin, 1, 8-cineole, elemene, borneol, and bornyl acetate. There have been claims made about the plant's antifungal, anti-asthmatic, smooth muscle relaxant, antimicrobial, antioxidant, analgesic, locomotor depressant, anticonvulsant, and muscle relaxant benefits, as well as its anti-inflammatory characteristics. It is today regarded as an important source of distinctive natural compounds for the creation of medications to treat a variety of ailments.

Keywords: Pharmaceutical medication, ethnopharmacology, plant nutrients, antifungal activities, etc.

Introduction

Designing, producing, and creating pharmaceutical medications are all part of the field of medicinal or pharmaceutical chemistry, which sits at the interface of chemistry and pharmacology. Identification, synthesis, and development of novel chemical entities fit for

therapeutic use are all part of medicinal chemistry. [1] It also covers research on currently available medications, their biological characteristics, and quantitative structure-activity correlations (QSAR). Pharmaceutical chemistry is concerned with the quality of medications and works to ensure that they are fit for their intended use. The majority of substances utilized as medications are organic, including biopolymers and tiny organic molecules. However, it has been discovered that inorganic and metal-containing substances can be used as medicines. [2] For instance, the platinum-containing compounds in the cis-platin class have been used as anti-cancer medications. Organic chemistry, biochemistry, computational chemistry, pharmacology, pharmacognosy, molecular biology, statistics, and physical chemistry are all combined in the extremely interdisciplinary field of medicinal chemistry. Plants, animals, and minerals are examples of natural resources that have been used to treat human diseases. Indigenous people used thousands of different plants to make medicinal products, but it is still important to know if they were using remedies or poisons. [3] The pharmacology, chemistry, pharmacology, and clinical treatments of ayurvedic medicinal plants have been the subject of extensive study. [4] Many of the largest pharmaceutical companies have updated their strategy to emphasize the development of drugs from natural ingredients, and it is crucial to use systems biology technologies to speed up the process. Through the study of ethnopharmacology and conventional medicine, numerous medications have made their way into international pharmacopeia. Newer standards for manufacturing, quality control, and standardization are needed for Ayurvedic and other traditional medications. Ayurvedic medicines typically use a distinctive holistic approach and are adapted to a certain constitution. [5] Reverse pharmacology can be used in traditional knowledge-driven drug development to speed up and lower the cost of the development process. It is anticipated that innovations in lead structure identification and drug target elucidation will primarily lead to new ways to improve and speed up the combined drug discovery and development process. [6] Intentional, targeted, and safe natural product research to re-discover the drug discovery process will be substantially facilitated by using traditional knowledge as a strong search engine, which is also its most important function. [7] One of the oldest surviving traditions, Ayurveda is still widely practiced in Sri Lanka, India, and other nations and has a strong philosophical foundation.

Importance of medicinal plants in drug discovery

The isolation of chemicals from plants and other natural sources, synthetic chemistry, combinatorial chemistry, and molecular modeling are just a few of the techniques that have been used to acquire molecules for drug discovery.[8] Pharmaceutical companies and funding organizations have recently shown an interest in molecular modeling, combinatorial chemistry, and other synthetic chemistry techniques, but natural products, particularly medicinal plants, continue to be a significant source of new drugs, drug leads, and new chemical entities (NCEs). 25% of the top-selling pharmaceuticals globally in 2020 and 2021 were either natural ingredients themselves or products derived from them. Four new pharmaceuticals with medicinal plant origins have also just entered the American market.

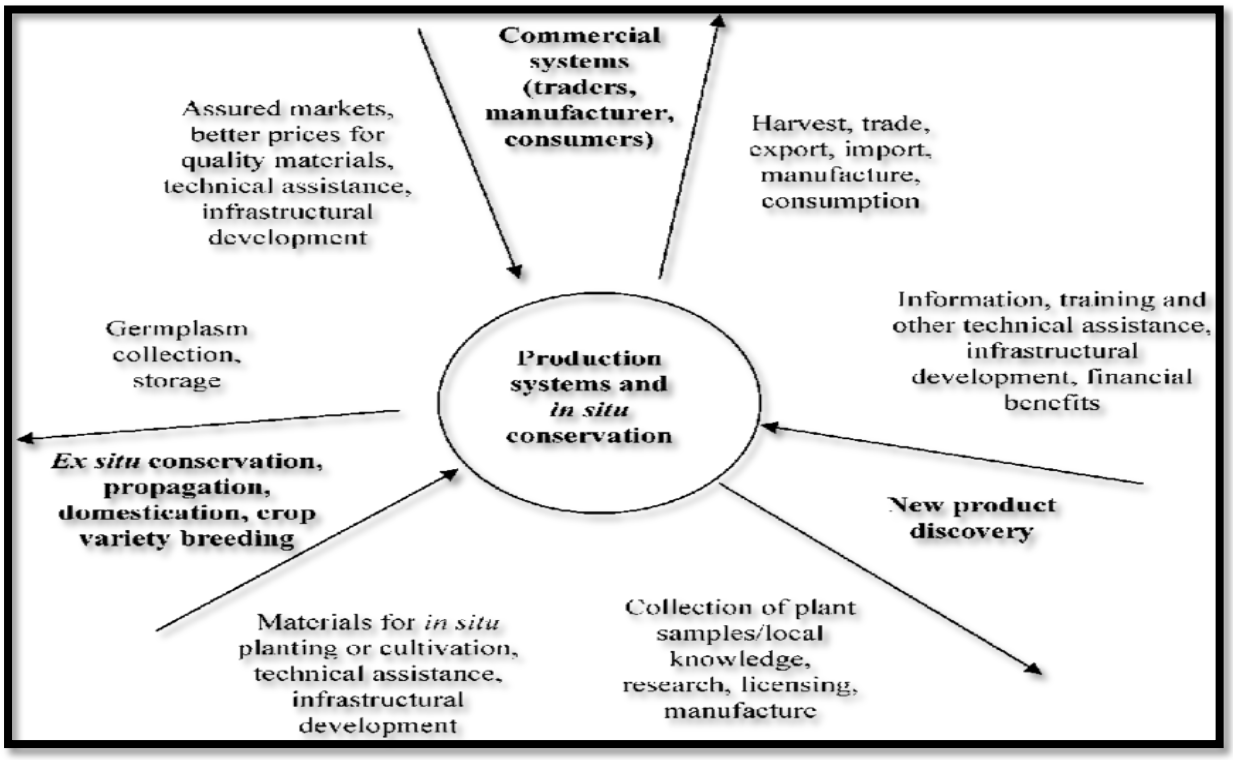


Fig.1 Flow diagram represent the production systems and in situ conservation

The demand for herbal goods is currently skyrocketing around the globe, and large pharmaceutical industries are actively researching a variety of plant materials for their potential medical benefits.[9] An increasing number of research publications based on herbal drugs are appearing in numerous journals, both national and international. Numerous analysis-based studies on pharmaceutical research in India have been carried out in the past and are now becoming more and more popular.[10] The study of testing the safety and efficacy of herbal remedies by combining contemporary experimental methodology with traditional knowledge Additionally, there is a dearth of research on medicinal plants and their extracts in the pharmaceutical industry, yet developed nations are growing more interested in Indian herbal products such as food supplements, cosmetics, and intermediates.[11,12]

Advancement in phytochemical analysis technique

The ongoing advancement of chromatographic and spectroscopic methods of analysis has made it easier to separate, identify, and determine the structure of physiologically active substances. Over the years, these advancements as they relate to phytochemistry have been emphasized at PSE symposia. [13] The phytochemistry unit serves as a laboratory for the extraction, fractionation, and chromatographic analysis of chemicals extracted from herbs and medicinal plants, as well as for the gathering and processing of herbs and plants. Additionally, this unit coordinated the collection, identification, and phytochemical analysis of plants in close collaboration with other units within HMRC and IMR. Additionally, this unit has the ability to standardize herbal goods and extracts. [14] Phytochemicals or phytonutrients are chemical compounds such as beta-carotene that occur naturally in plants;

health-protecting compounds found in fruits, vegetables, and other plants. Phytochemicals (sometimes called phytonutrients) include beta-carotene, lycopene, and resveratrol. Plants have been one of the important sources of medicine since the beginning of human civilization.[15]

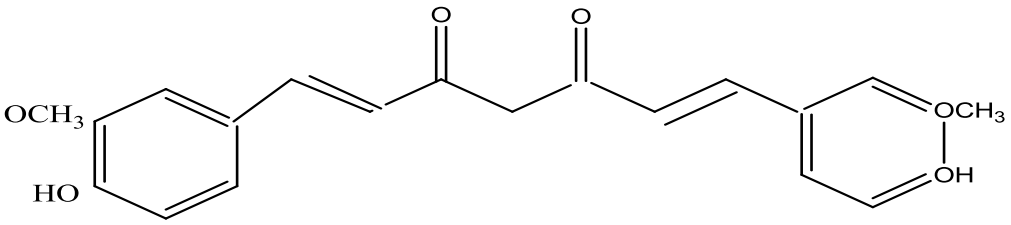
Plant profile

Curcuma cassia, black turmeric, or black zedoary is a perennial herb with a bluish-black rhizome, native to North-East and Central India. Black turmeric is also sparsely found in the Papi Hills of East Godavari, West Godavari of Andhra Pradesh, and Khammam district of Telangana. The rhizome of black turmeric has high economic importance owing to its putative medicinal properties.[16]

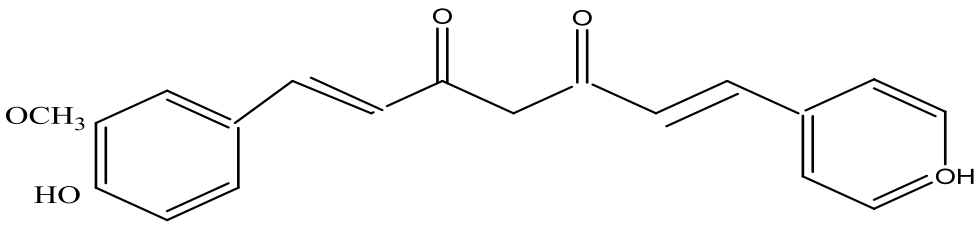
Scientific Classification	
Kingdom	Plantae
Unranked	Angiosperms
Unranked	Monocots
unranked	Commelinids
Order	Zingiberales
Family	Zingiberaceae
Genus	Curcuma
Species	C. caesia
	

Major chemical composition of Curcuma caesia

Among the components of turmeric are moisture (13.1%), protein (6.3%), fat (5.1%), minerals (3.5%), and carbs (69.4%). The yellow color is caused by the phenolic diketone curcumin (diferuloylmethane), which is made up of curcumin I (94%), curcumin II (6%), and curcumin III (0.3%). Demethoxycurcumin and bisdemethoxycurcumin, two more phenolic diketones, have also been isolated from Curcuma longa rhizomes.[17] The rhizomes have been found to include turmerones (a and b), curdione, curzerenone, and mono-, and di-demethoxycurcumin. A-phellandrene (1%), sabinene (0.6%), cineol (1%), borneol (0.5%), zingiberene (25%), and sesquiterpenes (53%), are all present in the essential oil (5.8%) produced by steam distillation of rhizomes. Spectral techniques have been used to clarify the structures.



CURCUMIN II



CURCUMIN III

Fig.2

Chemical structure represent the chemical constituents of Curcuma caesia

Medicinal uses of Curcuma caesia

After a Turkish bath, the body is rubbed with the rhizomes as a rubefacient. It is employed in Bengal as fresh turmeric. The Baiga, Sahariya, Agariya, Gond, Korku, and other tribal people of the Madhya Pradesh state's Mandla, Balaghat, Chhindwara, Anooppur, and Dindori districts frequently utilize the herb's rhizomes to treat pneumonia, cough, and cold in children, as well as fever and asthma in adults. According to some claims, rhizomes can treat cancer, epilepsy, leukoderma, and HIV/AIDS.

Material and Method

Natural resources like plants, animals, and minerals are used to make crude medications. It is crucial that they are correctly recognized and described in terms of their physical and chemical properties. As a result, quality control should be put in place.[18] One of the 33 species of the genus Curcuma is Curcuma caesia. This article makes it abundantly clear that this herb is one of the understudied ones and requires a scientific method to demonstrate its therapeutic benefits. Our research's objective is to offer solid proof of this unstudied herb's medical benefits.[19] Phytochemical analyses of the various Curcuma caesia extracts were done.

Table 1: Physical characteristics of extracts of *Curcuma caesia.*

Name of Extract	Consistency	Color	Odor	Extractive value (%w/w)
Petroleum ether extract	Semi- Solid	Dark green	Characteristic	7.7%
Ethanolic extract (Direct)	Semi- Solid	Dark green	Pungent	11.5%

Pharmacological screening

Antifungal activity[20]

The antifungal activity of the compounds obtained from Curcuma caesia during the current experiment was examined. Four common microorganisms, including C. albicans, M. audouinii, A. niger, and T. mentagrophytes, were used in the antifungal experiments. By using the disc-diffusion method, the compounds' antifungal activity was evaluated.

Preparation of standard solution

The standard drug used for the testing is Flucanazole. It is water soluble; the concentration of this drug is adjusted so as to contain 100 µg/ ml.

Method of testing

To ensure consistent cooling, the previously produced nutritional agar media is cooled to 45 °C while being gently shaken. A culture that was 18 to 24 hours'old was aseptically added to this and well mixed with gentle shaking. This was put in the petri dishes (20 to 25 ml in each large petri dish) and left to sit for an hour. After that, the cups were created by using a sterile cork borer to pierce the set agar and then scooping out the agar that had been pierced. Each cup has a diameter of 48 mm. 100 µl of the test chemical, which was made in DMSO, was added to these cups. The medication solution was then added, and it was left to diffuse at room temperature for about 45 minutes. The plates were then placed in an incubator and kept at 37 °C for 24 hours. The area of inhibition in millimeters, or the diameter of inhibition after 24 hours, was assessed.

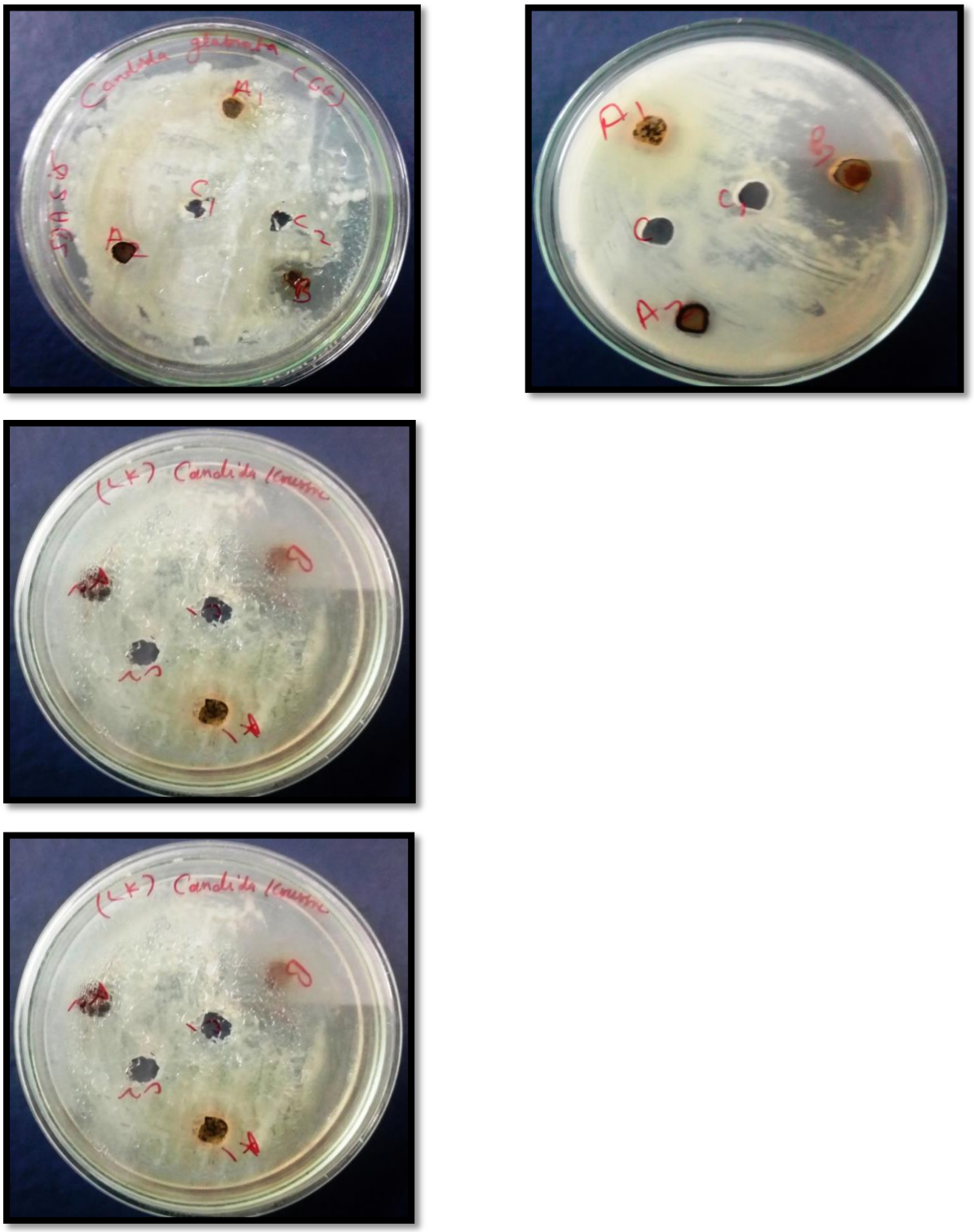


Fig.3 Systematic diagram represent the Antifungal activity in standard drug and Plant extract

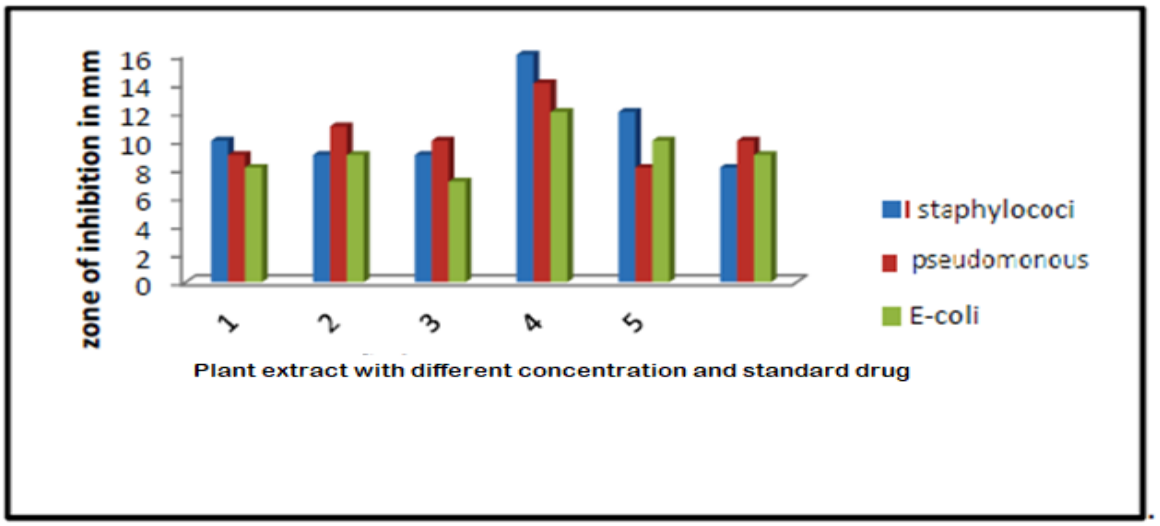


Fig.4- Bar graph represent the antibacterial activity of extract/standard

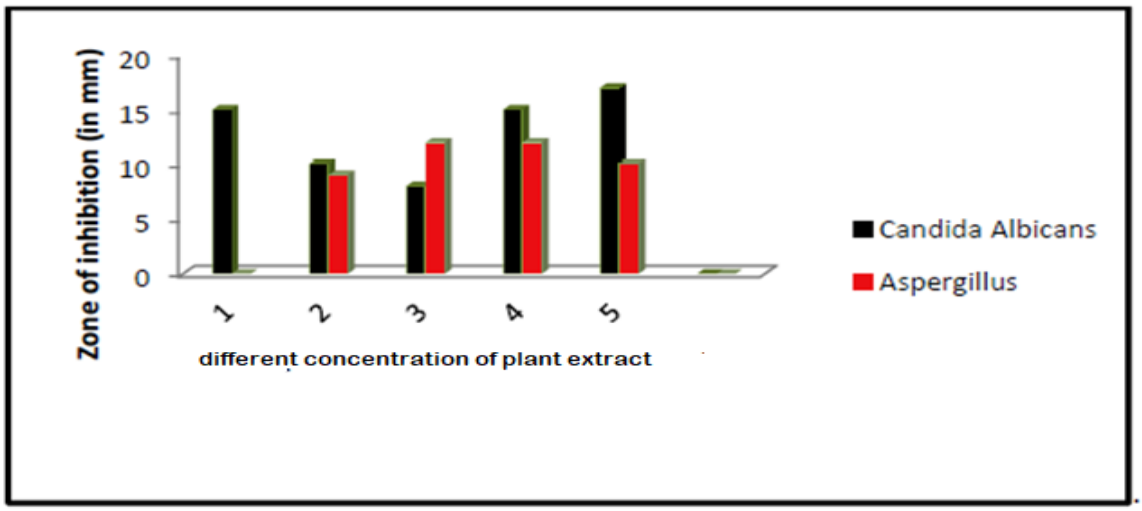


Fig.5 Bar graph represent the antifungal activity of extract/drug

Result and Discussion

Concluding the whole work done in *Curcuma caesia*. It clearly revels one important fact that it has tremendous medicinal value just a scientific approach is needed. As this plant has shown good response towards both the phytochemical as well as the pharmacological studies. It shows that it may be employed in upcoming research works for various other works. All the Phytochemical work done in this plant clearly states that it has number of chemicals present in it specially flavonoids, saponins, and tannins. Apart from the free radical scavenging the antimicrobial potential of this plant may be because of the gastro protective action of flavonoids, saponins and tannins. The present work revels that this plant may be employed in various antimicrobial activities with that it can show good response towards all the free radical generated ailments. For the pharmacological screening both the fractions as well as ethanolic extract were opted. The results obtained from the various screening models which were performed for antiulcer, antidepressant, and antioxidant activities of Curcuma caesia were provoking to isolate the active moiety of plants, especially

from its ppt. fraction, as this fraction gave the best outcome in all the pharmacological screening models. The hidden potential of this plant needs a scientific approach. This work guides many ways leading to herbalism.

CONFLICT OF INTEREST: The authors declare no conflict of interest

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