

PHARMACOLOGICAL STUDIES OF *Ficus septica*: A MEDICINAL PLANT REVIEW

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ABSTRACT

Ficus septica is a plant that belongs to the *Moraceae* family. Wild areas, or bush forests, typically host this plant. People frequently employ the sap of the *F. septica* plant, found in its roots, twigs, leaves, and fruit, to alleviate digestive issues and poisoning. At present, numerous studies have demonstrated that *F. septica* is a medicinal plant with the potential to perform a variety of pharmacological activities. Traditional medicine has documented a variety of pharmacological activities in the leaves, roots, and twigs of this plant, utilizing them as antibacterial, antiplasmodial, antioxidant, antifungal, antiviral, immunomodulatory, and anticancer agents. Therefore, the focus of this review article is on the potential pharmacological activity of the *F. septica* plant.

KEYWORDS: *Ficus septica*, Antibacterial, Antiplasmodial, Antioxidant, Antifungal, Antiviral, Immunomodulatory, Anticancer.

INTRODUCTION

Both allopathic and traditional medical systems throughout the world use medicinal plants in various ways to maintain health or treat specific diseases. Even people who only use allopathic medicines throughout their lives tend to rely on herbal medicines because 20-25% of prescribed medicines come from plants.^[1] Researchers continue to explore active compounds from natural ingredients, particularly medicinal plants, which people have traditionally used to treat various diseases in various countries.^[2,3] The *Moraceae* family includes *Ficus septica* Burm. f., a tree or shrub with a yellowish exudate, found in countries like Taiwan, Malaysia, Australia, and Vanuatu.^[4] *F. septica* has various properties, such as antibacterial, antiplasmodial, antioxidant, antifungal, antiviral, immunomodulatory, and anticancer. Currently, there are no detailed evaluation reports regarding the potential to demonstrate *F. septica*'s effectiveness; therefore, this review article will discuss *F. septica*'s potential pharmacological activity.

Antibacterial

Antibacterial drugs combat pathogenic bacteria by killing and reducing their metabolic activity, thereby minimizing their pathogenic effect on the biological environment.^[5,6] However, current drugs have side effects such as disturbances in energy metabolism, nucleic acid synthesis, coenzyme metabolism, and cell

leakage.^[7] In vitro research reported that administration of *F. septica* at concentrations of 25% and 35% was able to inhibit the growth of *Staphylococcus aureus* bacteria, and this plant extract showed strong antibacterial properties.^[8]

Antiplasmodial

The Plasmodium parasite causes malaria, an infectious disease. Infected female Anopheles mosquitoes, also known as "malaria vectors," transmit this parasite to humans through their bites. In 2015, there were around 3.2 billion people, or almost half the world's population, at risk of malaria. The latest WHO report estimates that malaria infection affects 214 million people in 97 different countries, leading to approximately 438,000 deaths.^[9] The emergence of *P. falciparum* resistance to several antimalarial drugs is currently increasing the incidence of malaria, necessitating the urgent need for new, more effective antimalarial drugs. Natural products remain a potential source of new and selective substances important for malaria treatment.^[10] In vitro studies showed that giving *F. septica* stopped the growth of *P. falciparum* strain 3D7 with an IC₅₀ value of 0.028-0.42 μ M.^[11]

Antioxidant

Free radicals are defined as molecules that lose their electrons, causing the molecule to become unstable and try to reclaim electrons from other molecules or cells.^[12]

Antioxidants are well-known for their ability to directly scavenge free electrons, or increase the expression and activity of free scavenging enzymes in the body. Free radicals like hydroperoxides, peroxides, and peroxy lipids can be stopped by antioxidant compounds like polyphenols, flavonoids, and phenolic acids. This stops the oxidative processes that cause degenerative diseases.^[13,14] *F. septica* may be an antioxidant, according to research done in a lab setting with an IC₅₀ concentration of 4.45 µg/mL.^[15]

Antifungal

Fungal infections have become a serious threat to human health and cause at least 1.5 million deaths worldwide each year. Fungal infections are a common problem that occurs in at least 20–25% of the world's population. Since 1980, the prevalence of fungal infections has increased in many patient groups. Human infections involving fungi are a serious problem, especially in tropical and subtropical developing countries.^[16] In vitro research reported that administration of *F. septica* at a dose of 25 µL was able to inhibit *Candida albicans* growth with an inhibition zone of 17.67 mm.^[17]

Antiviral

Dengue virus type 1-4 (DENV-1-4) is a positive-strand RNA virus with an envelope that belongs to the *Flaviviridae*. Each type has the ability to cause disease. DENV infection causes varying degrees of disease manifestations, such as self-limiting dengue fever, skin rash or drowsiness, agitation, liver enlargement, Dengue Hemorrhagic Fever (DHF), and even death. A second DENV infection can cause life-threatening dengue shock syndrome (DSS). Currently, there is no specific therapy available for this infection other than supportive treatment.^[18] Researchers in the lab found that giving DENV-2 *F. septica* at concentrations of 25 and 50 µg/mL could stop its growth.^[19]

Immunomodulatory

Immunity is the body's reaction to foreign materials that enter the body molecularly or cellularly. The immune system in the body is made up of T cells produced by the thymus and B cells produced in the spinal cord. Adding an immunomodulator can stimulate the development and activity of T cells. The immunomodulator is substances that can modulate the function and activity of the immune system. The immunomodulator is divided into three groups: 1) the immunostimulator, which functions to increase the function and activity of the immune system; 2) the immunoregulator, which means that they can regulate the immune system; and 3) the immunosuppressor, which can inhibit or suppress immune system activity.^[20] Administration of *F. septica* extract at doses of 750 and 1,500 mg/kg was reported to increase lymphocyte density, phagocytic activity, macrophage capacity, and increase blood CD8⁺ levels, as well as reduce splenic IL-10 expression in mice induced by doxorubicin.^[21]

Anticancer

Cancer is a disease associated with the uncontrolled growth and spread of abnormal cells. Abnormal cells are characterized by changes in cell differentiation and communication with their extracellular environment. With these characteristics, cancer is one of the world's leading causes of morbidity and death. According to the World Health Organization's (WHO) global report, the number of new cancer cases reached 14.1 million and 8.2 million cancer-related deaths in 2012. Consequently, these high numbers have prompted various efforts to discover new cancer treatments. These efforts include research on chemotherapy agents from medicinal plants.^[22] According to research done in a lab, giving T47D breast cancer cells *F. septica* fractions had an IC₅₀ value of between 2.57 and 2.73 µg/mL.^[23]

CONCLUSION

Scientific research has proven that *F. septica* possesses antibacterial, antiplasmodial, antioxidant, antifungal, antiviral, immunomodulatory, and anticancer properties, with different mechanisms of action for each tested disease. However, further research is necessary to determine the effectiveness of *F. septica* in managing various diseases, aiming to develop it as an alternative treatment to synthetic drugs that have now demonstrated detrimental side effects.

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