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Review Article

A Review On Morphological, Taxonomical, Pharmacological Aspects Of Ficus Carica (Fig) With Focus On Its Uses

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ABSTRACT

Ficus carica (fig) is a historically significant plant known for its medicinal and nutritional value, widely used in traditional medicine and now gaining attention in modern pharmacology. This review explores the morphological and taxonomical aspects of *Ficus carica*, highlighting its unique characteristics and botanical classification. The pharmacological potential of fig is discussed with a focus on its antioxidant, anti-inflammatory, antimicrobial, antidiabetic, anticancer, cardioprotective, and neuroprotective properties. Furthermore, the review emphasizes the therapeutic applications of fig in managing oxidative stress, diabetes, cardiovascular diseases, and neurological disorders, underscoring its role as a multifunctional plant with diverse health benefits. The review aims to consolidate existing research, providing a comprehensive overview of the medicinal properties of *Ficus carica*, while identifying potential areas for future study.

INTRODUCTION

Ficus carica, commonly known as fig, is a member of the Moraceae family and is one of the oldest cultivated plants in human history. The fig tree is believed to have originated in the Mediterranean and western Asia, where it has played a significant role in the diets and medicinal practices of various civilizations for thousands of years. As both a fruit-bearing tree and a medicinal plant, *Ficus carica* holds a unique place in history, deeply

rooted in ancient cultures such as the Egyptians, Greeks, and Romans. The fig tree is also referenced in religious and mythological texts, symbolizing fertility, abundance, and wisdom, making it an integral part of cultural traditions worldwide. The medicinal use of *Ficus carica* is equally rich, with its various parts—leaves, fruits, roots, and latex—being utilized in traditional remedies to treat a wide range of ailments. It has

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been used in folk medicine to address conditions such as digestive disorders, respiratory illnesses, skin diseases, and cardiovascular problems. This traditional knowledge is now being supported by modern pharmacological research, which highlights the therapeutic potential of fig extracts and their bioactive compounds.

The objective of this review is to provide a comprehensive overview of *Ficus carica* from multiple perspectives: morphological, taxonomical, and pharmacological. The review will delve into the fig plant's botanical characteristics, its classification, and its medicinal properties, with a particular focus on its pharmacological activities. It will also explore the historical significance of the fig, examine its phytochemical composition, and highlight its potential uses in modern medicine. The scope of this review encompasses both traditional uses and contemporary research, aiming to bridge the gap between historical practices and modern pharmacotherapy.

Taxonomical Classification

Ficus carica belongs to the Moraceae family, which includes several genera of tropical and

subtropical plants. The full botanical classification of the fig is as follows:

Kingdom	plantae
Division	Magnoliophyta
Class	Magnoliopsida
Order	Rosales
Family	Moraceae
Species	<i>Ficus Carica</i>
Local name	anjeer
Genus	<i>Ficus</i>

Ficus carica is one of the hundreds of species within the *Ficus* genus, which exhibits significant genetic diversity. Within the species, different varieties have been classified based on fruit characteristics, environmental adaptability, and genetic makeup. These cultivars are broadly divided into common figs, caprifigs, Smyrna figs, and San Pedro figs. The fig tree's phylogenetic relationships with other *Ficus* species suggest a long history of co-evolution with fig wasps, which are integral to their unique pollination system. *Ficus* species are primarily found in tropical regions, but *Ficus carica* thrives in temperate climates, further reflecting its adaptability.

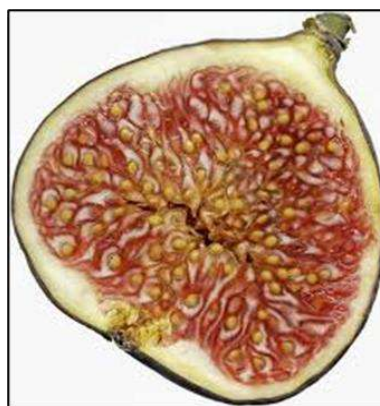


Figure 1: *Ficus Carica*

Type of fig

Figs are typically in season starting in mid-May and last through November. Some varieties (like Black Mission) actually have two seasons: the early summer season produces fruit on old tree

branches, and the late-summer/fall season produces fruit on new branches.

There are many varieties of figs that are suitable for the Indian climate, such as

- Brown Turkey
- Black Mission

- Kadota
- Conadria,
- Calimyrna

1) **Poona fig:** - The Poona fig, also known as the Anjeer puna fig, is a variety of the fig (*Ficus carica*) that is known for its sweet, nutritious fruits:

Fruit

The Poona fig is bell-shaped, medium-sized, and weighs about 20–30 grams. It has a thin skin that is light purple with red or maroon flesh inside.

Harvesting

The fig harvesting season in India is from February–March to May–June. The fruits are manually harvested in 2–3 day intervals and should be picked when they are soft and wilt at the neck.

Uses

It is the rich source of Fiber helps in digestion.

It contents Antioxidant help prevent or minimize cell damage caused by free radicals.

Fig fruit extract drink has lower glycemic index (GI) help to control the blood sugar level.



Figure 2: - Poona fig

2) Dinkar: -

Figs are about 3.8 cm long and 3.95 cm wide, and weigh around 27.23 grams. They have a dark red exterior and dark pink flesh.

Figs are considered a false fruit, and are actually inverted flowers with both male and female parts enclosed in stem tissue. They can be pear-shaped, and range in color from yellowish to brownish violet depending on the variety and how ripe they are.

Harvest time

The harvest season for figs is from February–March to May–June. The fruit should be picked when it is soft and the neck is tilted.

Uses: -

- Digestive health: Figs are high in fiber and can act as a natural laxative.
- Antioxidants: Figs are rich in polyphenols, which are protective plant compounds that help prevent damage to cells and tissues
- Bone health: Figs are a good source of calcium, magnesium, and phosphorus.
- Blood pressure: Figs may help support healthy blood pressure.



Figure 3: Dinkar

3) Calimyrna

- Calimyrna figs have light-green to yellow skin, as opposed to Mission fig.
- Calimyrna figs have a delicate, nut-like flavor.
- When dried, they turn golden tan
- The fruit was originally grown in Turkey and dubbed the Smyrna fig, for the famous ancient Turkish city.

When California growers began cultivating it, they altered the name to Calimyrna.



Figure 4: Calimyrna

Morphological Description:

Morphology Fig grows on tiny bushy trees normally 10–12 m in height with numerous spreading branches, smooth grey or white dull bark and a trunk rarely more than 7 inch in diameter. The plant can withstand even the most hostile conditions thanks to its shallow roots and vigorous spreading habit. Roots may reach a depth of 20 feet and cover about 50 feet below the surface. The leaves of the deciduous plant are palmate and deeply split into 3–7 main lobes. The leaves of the tree are fragrant, 12–25 cm long and 10–18 cm broad and fairly thick. The rough upper surface and soft, hairy underside of the fig leaves are their defining features. The plant produces a lot of milky latex; that is, when the leaves and stem are broken, white latex is released.

1. Shape:

The fig fruit has a distinct pear-shaped or spherical structure. Some varieties may exhibit a more flattened or elongated form. The apex of the fruit (the top) often contains a small opening called the ostiole or "eye."

2. Size:

The size of *Ficus carica* fruits can vary significantly depending on the variety and growing conditions. Typically, figs range from 2.5 cm to 10 cm in length and 2 cm to 5 cm in diameter. They are generally small to medium-sized fruits.

3. Color:

The color of the fig fruit's outer skin (pericarp) can vary widely, depending on the variety:

- **Green:** Common in some varieties when unripe; can remain green when ripe in certain cultivars (e.g., Kadota figs).
- **Yellow:** Some varieties turn yellow when ripe.
- **Purple or Black:** Common in varieties like Black Mission figs, where the skin darkens as the fruit ripens.
- **Brown:** Many ripe figs exhibit a brown or bronze color, especially varieties like Brown Turkey.

The internal flesh is usually red, pink, or amber, depending on the variety.

4. Odor:

- Unripe figs have a neutral or mildly green odor. Ripe figs possess a distinctive sweet, honey-like aroma. The odor becomes more pronounced as the fruit ripens, giving off fruity, sugary notes.
- The odor is often associated with ripeness, and overripe figs may have a fermented smell.

5. Taste:

- Ripe figs have a sweet and sometimes honey-like flavor, with a soft and juicy texture.
- The tiny seeds within the fig add a slight crunch, contributing to the overall texture.
- Unripe figs may taste bland or slightly bitter.

6. Skin Texture:

- The skin of the fig fruit is generally smooth and thin, although some varieties may have slightly rough or leathery textures.
- The skin is edible and softens as the fruit ripens.

7. Pulp:

- The inner part of the fruit (pulp) is soft, with a fleshy, juicy texture.
- The pulp is filled with numerous tiny seeds (drupelets), each surrounded by sweet, gelatinous flesh.
- The pulp can range from amber, pink, to deep red, contributing to the overall color and appeal of the fruit.

Phytochemical Composition:

Ficus carica contains a wide array of bioactive compounds that contribute to its medicinal properties. The primary phytochemicals identified in fig fruits and leaves include flavonoids, phenolic acids, alkaloids, and tannins. These compounds have been shown to exhibit antioxidant, anti-inflammatory, and antimicrobial activities. Flavonoids, such as quercetin and

kaempferol, are potent antioxidants that help neutralize free radicals, reducing oxidative stress and inflammation. Phenolic acids, including gallic acid and chlorogenic acid, have also been identified as major contributors to the fig's health benefits, particularly its antimicrobial and anticancer properties. The nutritional profile of fig fruits is equally noteworthy, with figs being rich in dietary fiber, vitamins (such as vitamin A, B1, B2, and C), and minerals like potassium, calcium, magnesium, and iron. The high fiber content, particularly soluble fiber, aids in digestive health and helps regulate blood sugar levels. The fruits are also a source of polyphenols, which have been linked to cardiovascular and anti-diabetic benefits. *Ficus carica* latex, obtained from the plant's stem and leaves, is rich in proteolytic enzymes like ficin, which exhibit wound healing and anti-inflammatory properties. Various extraction methods, such as solvent extraction and supercritical fluid extraction, have been employed to isolate these bioactive compounds from different parts of the plant. Techniques such as high-performance liquid chromatography (HPLC) and gas chromatography-mass spectrometry (GC-MS) are used to identify and quantify these phytochemicals, providing insights into their therapeutic potential and supporting their use in both traditional and modern pharmacotherapy.

Traditional Uses Of *Ficus Carica*:

Ficus carica has a rich history in traditional medicine across various cultures. In ancient Egypt, figs were considered sacred and were often placed in tombs as offerings. In traditional Mediterranean and Middle Eastern medicine, figs were used to treat a range of ailments such as gastrointestinal problems, respiratory disorders, and skin conditions. Ayurvedic practitioners in India utilized fig leaves and fruits for their laxative and digestive properties, as well as for their ability to soothe inflamed skin. In Greco-Roman times, figs were highly valued for their nourishing and

medicinal qualities, with Hippocrates and other early physicians recommending them for their health benefits.

Folk remedies involving *Ficus carica* often include the use of its latex as a treatment for warts and other skin lesions. The fig fruit was also traditionally used as a gentle laxative and for treating respiratory conditions such as bronchitis. Additionally, the fruit and leaves were applied as poultices to treat wounds and abscesses. Beyond medicinal uses, figs have had significant culinary and non-medicinal applications. Fig fruits have been consumed as a staple food, especially in arid regions, providing a rich source of fiber, natural sugars, and essential nutrients. The leaves and bark of the fig tree were also used in traditional crafts and rituals in various cultures.

PHARMACOLOGICAL ACTIVITIES:

Antioxidant Properties

Ficus carica exhibits potent antioxidant properties, playing a critical role in combating oxidative stress, which is implicated in aging and various diseases such as cancer and cardiovascular disorders. The fig contains high levels of phenolic compounds, flavonoids, and vitamins, which act as free radical scavengers, neutralizing reactive oxygen species (ROS) and reducing cellular damage. These antioxidant effects help maintain cellular integrity and have been studied in relation to chronic diseases, where oxidative stress is a key contributor. The protective nature of *Ficus carica* against oxidative damage makes it a valuable plant in managing conditions related to excessive ROS production.

Anti-inflammatory Activity

Ficus carica has been shown to have significant anti-inflammatory effects, making it useful for treating inflammation-related disorders such as arthritis, inflammatory bowel disease, and skin inflammations. Its anti-inflammatory properties are mainly attributed to the bioactive compounds such as flavonoids, phenolics, and



polysaccharides, which inhibit pro-inflammatory cytokines and enzymes like cyclooxygenase (COX) and lipoxygenase (LOX). This inhibition helps reduce inflammation and tissue damage. Studies suggest that fig extracts can be used therapeutically to manage chronic inflammation and associated complications.

Antimicrobial Effects

Ficus carica possesses strong antimicrobial properties, showing efficacy against a range of bacteria, viruses, and fungi. Various studies have demonstrated that fig extracts, particularly from leaves and fruits, exhibit antibacterial activity against pathogens like *Escherichia coli*, *Staphylococcus aureus*, and *Salmonella typhi*. The antiviral properties of *Ficus carica* have been explored in the context of viral infections, while its antifungal activity has been tested against fungal strains such as *Candida albicans*. These antimicrobial effects are attributed to the presence of phytochemicals like flavonoids, terpenoids, and alkaloids, which disrupt microbial growth and metabolism.

Antidiabetic Activity

Ficus carica has shown promising antidiabetic potential, with its extracts helping to regulate blood glucose levels and improve insulin sensitivity. The presence of bioactive compounds like flavonoids, phenolics, and terpenoids is believed to be responsible for this effect. Fig extracts may enhance glucose uptake by cells and reduce glucose production in the liver, thus lowering blood sugar levels. Additionally, fig leaf extracts have been traditionally used to treat diabetes, with some clinical studies indicating their beneficial role in reducing postprandial blood glucose levels. This makes *Ficus carica* a valuable component in managing type 2 diabetes.

Anticancer Potential

Research has shown that *Ficus carica* has anticancer properties, with its extracts having the potential to prevent or inhibit cancer progression.

Fig extracts contain bioactive compounds such as flavonoids, polyphenols, and anthocyanins, which exhibit anticancer effects by inducing apoptosis (programmed cell death), inhibiting cell proliferation, and preventing angiogenesis (formation of new blood vessels that feed tumors). Studies have demonstrated the effectiveness of fig extracts against various cancer cell lines, including breast, colon, and lung cancer cells. These findings highlight the potential role of *Ficus carica* in cancer prevention and therapy.

Cardioprotective Properties

Ficus carica plays a significant role in promoting cardiovascular health. The plant's cardioprotective properties are attributed to its high content of antioxidants, dietary fiber, and potassium, which help reduce blood pressure, improve lipid profiles, and protect against heart disease. Fig extracts have been shown to lower levels of LDL (bad) cholesterol while increasing HDL (good) cholesterol, thus reducing the risk of atherosclerosis. Additionally, the antioxidant properties of *Ficus carica* help mitigate oxidative stress in cardiovascular tissues, preventing damage to blood vessels and the heart.

Neuroprotective Effects

Ficus carica has demonstrated neuroprotective properties, offering potential benefits in the management of neurological diseases such as Alzheimer's and Parkinson's disease. The antioxidant and anti-inflammatory compounds present in figs can protect neurons from oxidative damage and neuroinflammation, which are common in neurodegenerative conditions. Moreover, studies suggest that fig extracts may inhibit the aggregation of amyloid-beta, a protein involved in Alzheimer's disease pathology. The neuroprotective effects of *Ficus carica* highlight its potential use in preventing or slowing the progression of neurological disorders.

Medicinal Uses In Specific Conditions:



Ficus carica, commonly known as the fig tree, has a long-standing history of medicinal use, particularly in addressing gastrointestinal disorders. Its high fiber content makes it a natural remedy for constipation, as it helps to bulk up stools and promote regular bowel movements. The fruits are also beneficial for relieving indigestion, as they contain enzymes that aid digestion and help break down complex carbohydrates. Furthermore, the latex derived from the fig tree has been used traditionally to treat various skin issues, including dermatitis and warts, owing to its antibacterial and anti-inflammatory properties.

The hepatoprotective effects of *Ficus carica* are notable, with studies indicating that its bioactive compounds may help protect the liver from damage caused by toxins and excessive alcohol consumption. In terms of respiratory health, figs have been utilized to alleviate symptoms of asthma and bronchitis. The expectorant properties of fig syrup, derived from the fruit, can help soothe coughs and expel mucus, making it a valuable remedy for respiratory conditions. Additionally, *Ficus carica* is gaining recognition for its potential benefits in managing metabolic syndrome and obesity. The plant's high antioxidant content, combined with its ability to regulate blood sugar levels and improve lipid profiles, positions it as a promising candidate for weight management and metabolic health.

Phytopharmacological Mechanisms:

The medicinal properties of *Ficus carica* can be attributed to its diverse array of bioactive compounds, each contributing to its therapeutic effects. At the molecular level, compounds such as flavonoids and phenolic acids exert their effects through multiple cellular mechanisms, including the modulation of inflammatory pathways and antioxidant defenses. Research has shown that these compounds can influence signaling pathways such as NF- κ B and MAPK, leading to

reduced inflammation and enhanced cellular resilience.

Moreover, the synergistic effects of various phytochemicals in *Ficus carica* enhance its overall pharmacological efficacy. For instance, the combined action of flavonoids and phenolic acids can produce a greater antioxidant effect than when they act individually. Understanding the interactions between fig compounds and cellular pathways is crucial for elucidating their therapeutic potential and for the development of effective herbal formulations.

Herbal Formulations And Products:

Ficus carica is incorporated into various herbal formulations and products, reflecting its versatility in traditional and modern medicine. Common preparations include teas, syrups, powders, and extracts, which leverage the plant's health benefits while ensuring palatability. Fig leaf tea, for example, is popular for its anti-diabetic properties, while fig syrups are often used to soothe coughs and digestive issues.

In recent years, the commercial market has seen a rise in nutraceuticals containing *Ficus carica* extracts, marketed for their health-promoting properties. These products are often used in complementary and alternative medicine (CAM) settings, where they are combined with other herbal ingredients to create synergistic effects. The growing interest in natural remedies has positioned *Ficus carica* as a valuable component in dietary supplements aimed at enhancing overall wellness.

Clinical Studies:

Despite the traditional use of *Ficus carica*, scientific validation through clinical trials is still developing. A review of human clinical studies reveals promising outcomes regarding the efficacy of fig in treating conditions such as constipation, diabetes, and respiratory disorders. However, many studies have limitations, including small sample sizes and short durations, which hinder the establishment of robust conclusions.



Additionally, understanding the toxicity and safety profile of fig-based treatments is essential. While *Ficus carica* is generally considered safe when consumed in moderate amounts, some individuals may experience allergic reactions or gastrointestinal discomfort. Further research is needed to thoroughly investigate the safety of high-dose fig extracts and their interactions with conventional medications.

Challenges And Limitations:

The standardization and quality control of *Ficus carica* extracts pose significant challenges for researchers and manufacturers. Variability in phytochemical content can arise from factors such as cultivation practices, environmental conditions, and processing methods. This inconsistency can affect the efficacy and safety of herbal products, making quality assurance crucial. Regulatory challenges also hinder the widespread acceptance of *Ficus carica* as a therapeutic agent. The lack of comprehensive clinical trials and established dosing guidelines limits its use in conventional medical practice. Furthermore, potential side effects and interactions with conventional medications remain a concern, necessitating careful evaluation before recommending fig-based treatments.

Future Prospects:

Emerging research into *Ficus carica* is uncovering new pharmacological activities, highlighting its potential in various therapeutic applications. Studies are exploring the use of fig compounds in drug development, particularly their role in managing chronic diseases such as diabetes, obesity, and cancer. Future research directions include investigating the optimal cultivation practices for enhancing phytochemical yield, detailed phytochemical profiling, and extensive clinical validation of its medicinal uses. Additionally, understanding the synergistic effects of *Ficus carica* with other herbal remedies could pave the way for innovative formulations that

harness multiple therapeutic properties, enhancing patient outcomes in herbal medicine.

CONCLUSION:

In summary, *Ficus carica* is a multifaceted plant with rich morphological, taxonomical, and pharmacological aspects. Its historical use in traditional medicine and the growing body of scientific evidence supporting its health benefits underscore its importance in modern pharmacotherapy. Further research and validation of *Ficus carica*'s medicinal properties are essential to fully integrate its use into contemporary healthcare practices, offering a natural adjunct to conventional treatments for various health conditions. The future of *Ficus carica* in pharmacotherapy holds promise, especially as the demand for natural remedies continues to rise in the global health landscape.

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