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A review on nutritional values and pharmacological importance of *Ficus carica*

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Abstract
Ficus carica is the most popular member of the genus Ficus, and the family Moraceae. In the Mediterranean region it is so widely used, both fresh and dried, that it is called "the poor man's food." The dried fruits of *F. carica* have been reported as an important source of vitamins, minerals, carbohydrates, sugars, organic acids, and phenolic compounds. The plant has been used in traditional medicine for a wide range of ailments related to digestive, endocrine, reproductive, and respiratory systems, and also cancer. Additionally, it is also used in gastrointestinal tract and urinary tract infection. Phytochemical studies on the leaves and fruits of the plant have shown that they are rich in phenolics, organic acids, and volatile compounds. However, there is little information on the phytochemicals present in the stem and root. Reports on the biological activities of the plant are mainly on its crude extracts which have been proven to possess many biological activities. Some of the most interesting therapeutic effects include anticancer, hepatoprotective, hypoglycemic, hypolipidemic, and antimicrobial activities. Thus, studies related to identification of the bioactive compounds and correlating them to their biological activities are very useful for further research to explore the potential of *F. carica* as a source of therapeutic agents.

Keywords: tin, fig, Anjeer, nutrition, therapeutic, importance

1. Introduction
Plants are an essential component of the universe. Human beings have used plants as medicine from the very beginning of time. After various observations and experimentations medicinal plants were identified as a source of important medicine, therefore, treatment through these medicinal plants, began in the early stages of human civilization (Marwat *et al*., 2009) [12].

The genus *Ficus* (Moraceae) comprises one of the largest genera of angiosperms with more than 800 species of trees, shrubs, hemiepiphytes, climbers, and creepers in the tropics and subtropics worldwide (Mawa *et al*., 2013) [13]. *F. carica* is an important plant of this genus and commonly referred to as fig. *F. carica* is thought to have originated in western Asia and from there slowly spread through the Mediterranean region (Trad *et al*., 2014). Total world fig production is over 1 million tons (Trad *et al*., 2014). Turkey, Egypt, Algeria, Iran, Morocco, Spain, and the USA yielded about 80% of total production ("FAOSTAT," n.d.). The world fig exchanges are more important as dried (77%). Turkey, USA, and Spain are the main exporters of dried figs ("Fruits," n.d.). The therapeutic utilities of *F. carica* have been indicated in the traditional systems of medicine such as Ayurveda, Unani, and Siddha (Badgujar *et al*., 2014) [1]. It has been used to cure disorders of the endocrine system (diabetes), respiratory system (liver diseases, asthma, and cough), gastrointestinal tract (ulcer and vomiting), reproductive system (menstruation pain), and infectious diseases (skin disease, scabies, and gonorrhea). Fresh plant materials, crude extracts, and isolated components of *Ficus carica* have shown a wide spectrum of biological (pharmacological) activities (Badgujar *et al*., 2014) [1]. Besides medicinal use, fruits are one of the oldest forms of food known to man. There are many references to fruits in ancient man. There are many references to fruits in ancient literature. Vedas state that the fruits form the base of the Food of Gods. According to Qur'an, the fruits like grape, date, fig, olive and pomegranate are gifts and heavenly fruits of God. The people in ancient times regarded fruits to be endowed with magic or divine properties (Marwat *et al*., 2009) [12]. As food, *F. carica* is an important constituent of a Mediterranean diet. The fruit is highly nutritious and is consumed fresh or dried around the world (Solomon *et al*., 2006) [22].

They are an excellent source of minerals, vitamins, and fiber. Like other fruit, figs contain sugars and organic acids that influence their quality. They have high amounts of crude fibre (5.5%, w/w) and polyphenols (Vinson, 1999) [25], (Vinson *et al*., 2005) [26], which are good for human health.

2. Materials and methods
All the available information on *Ficus carica* was compiled from electronic databases such as Academic Journals, Ethnobotany, Google Scholar, PubMed, Science Direct, Web of Science, and library search.

3. Morphology
3.1. Description ("fig | Description, History, Cultivation, & Types," n.d.)**,** ("Search Results for 'fig' – California Rare Fruit Growers, Inc.," n.d.) Fig trees are fast growing, and spreading in habit, so that they tend to be greater in width than in height. Tree height at maturity varies according to genotype and typically ranges from 1 Meter (3 feet) to 10 to 12 metres (33 to 39 feet) high, with broad, rough, deciduous leaves that are deeply lobed or sometimes nearly entire. The leaves and stems exude white latex when broken. Fig fruits, known as syconia, are borne singly or in pairs above the scars of fallen leaves or in axils of leaves of the present season. Flowers are staminate (male) or pistillate (female) and enclosed within the inflorescence structure. Long-styled female flowers are characteristic of the edible fruits of most garden and orchard fig trees. Another type of tree, known as a caprifig, produces inedible figs that house the fig wasp young. It has short-styled female flowers that are adapted to the egg-laying habits of the fig wasp (*Blastophaga*) and also contains male flowers near the apex. Pollen from the caprifigs is carried by the fig wasps to pollinate both the edible and inedible figs. The wood of fig trees is low in density and breaks easily. Branches have a pithy interior.

3.2. Taxonomical Classification ("Common fig," 2021) [4]

Taxonomical Classification

Kingdom:	Plantae
Clade:	Tracheophytes
Clade:	Angiosperms
Clade:	Eudicots
Clade:	Rosids
Order:	Rosales
Family:	Moraceae
Genus:	*Ficus*
Species:	*F. carica*
Binomial name:	*Ficus carica* L.

Fig 1: A branch of fig tree with raw and semi ripe fruits

Fig 2: Ripe and unripe fruits

3.4. Distribution and Habitat ("Common fig," 2021) [4]
Native to the Mediterranean and western Asia, it has been sought out and cultivated since ancient times and is now widely grown throughout the world, both for its fruit and as an ornamental plant. The species has become naturalized in scattered locations in Asia and North America. The common fig tree grows wild in dry and sunny locations with deep and fresh soil, and in rocky locations that are at sea level to 1,700 meters in elevation. It prefers relatively porous and freely draining soil, and can grow in nutritionally poor soil.

3.5. Used part
Most commonly fruits, leaves

4. Nutritional value
Raw figs are 79% water, 19% carbohydrates, 1% protein, and contain negligible fat. They are a moderate source (14% of the Daily Value, DV) of dietary fiber per 100-gram serving (74 calories). When dehydrated to 30% water, figs have a carbohydrate content of 64%, protein content of 3%, and fat content of 1%("Figs, dried, uncooked Nutrition Facts & Calories," n.d.). In a 100-gram serving providing 249 calories, *dried* figs are a rich source (more than 20% DV) of dietary fiber and the essential mineral manganese (26% DV), while calcium, iron, magnesium, potassium, and vitamin K are in moderate amounts ("Common fig," 2021) [4].

Table 2: Nutritional value of fig

Nutritional value per 100 g		
Energy	310 kJ (74 kcal)	
Carbohydrates	19.2 g	
Sugars	16.3 g	
Dietary fiber	3 g	
Fat	0.3 g	
Protein	0.8 g	
Vitamins	**Quantity**	**%DV†**
Vitamin A equiv.	7 µg	1%
Thiamine (B1)	0.06 mg	5%
Riboflavin (B2)	0.05 mg	4%
Niacin (B3)	0.4 mg	3%
Pantothenic acid (B5)	0.3 mg	6%
Vitamin B6	0.1 mg	8%
Folate (B9)	6 µg	2%
Vitamin C	2 mg	2%
Vitamin E	0.11 mg	1%
Vitamin K	4.7 µg	4%
Minerals	**Quantity**	**%DV†**
Calcium	35 mg	4%
Iron	0.4 mg	3%
Magnesium	17 mg	5%
Manganese	0.13 mg	6%
Phosphorus	14 mg	2%
Potassium	232 mg	5%
Sodium	1 mg	0%
Zinc	0.15 mg	2%
Other constituents	**Quantity**	
Water	79 g	

5. Pharmacological Activities

5.1. Antioxidant activity

(Vinson, 1999) [25] reported significant antioxidant activity in dried fruits of *Ficus carica*. Dried figs are *in vitro* antioxidants after human consumption. These findings suggest that dried fruits should be a greater part of the diet as they are dense in phenol antioxidants and nutrients most probably fiber.

5.2. Free radical scavenging activity

(Yang *et al*., 2009) [27] designed the method to study the ultrasonic assisted extraction of total flavonoids from the fruit of *Ficus carica* and their scavenging activities against hydroxyl and superoxide anion free radicals (Chawla *et al*., 2012) [3]. The optimum conditions for extracting total flavonoids from the leaves of Ficus carica were found to be the following: ethanol concentration 40%, material-to-liquid ratio 1:60 (g/ml), extraction temperature 60 C, and length of ultrasonic treatment of 50 min. Under these optimum conditions, the extraction efficiency of total flavonoids reached as high as 25.04 mg/g. The total flavonoid extract from the leaves had marked scavenging effects on both hydroxyl and superoxide anion free radicals in a concentration-dependent fashion.

5.3. Immunostimulant

(Patil *et al*., n.d.) [18] Shown that, the immunomodulatory effect of ethanol extract of the leaves of *Ficus carica* was studied in mice. This study was carried out with the help of various hematological and serological tests. Administration of extract remarkably ameliorated both cellular and humoral antibody response. Thus, the ethanol extract of the leaves of *Ficus carica* possess promising immunostimulant properties.

5.4. Antipyretic

The significant antipyretic effect of an ethanol extract of *Ficus carica* was demonstrated in a study (Vikas and Patil, 2010) [24], where this extract was effective at dose of 100, 200, and 300 mg/kg in reducing normal body temperature.

5.5. Anti-inflammatory

Petroleum ether (PEE), chloroform (CE), and ethanol (EE) extracts of *Ficus carica* leaves are reported for anti-inflammatory activity against carrageen an-induced rat paw edema. The EE exhibits greater anti-inflammatory effect than PEE and CE of *Ficus carica* as compared with the standard drug, indomethacin (Patil and Patil, 2011) [17].

5.6. Antispasmodic and anti-platelet

The aqueous ethanol extract (AEE) of *Ficus carica* fruit was studied for antispasmodic effect on rabbit jejunum preparations and for anti-platelet effect using ex vivo model of human platelets. When AEE is tested in isolated rabbit jejunum, it produced relaxation in a spontaneous way. AEE also inhibits the adenosine 50-diphosphate and adrenaline-induced human platelet aggregation. This study exhibits the remarkable spasmolytic property in the ripe dried fruit of *Ficus carica* along with anti-platelet activity that provides sound pharmacological basis for its medicinal use in the gut motility and inflammatory disorders (Gilani *et al*., 2008) [10].

5.7. Hepatoprotective

The methanol extract of the leaves of *Ficus carica* was evaluated for hepatoprotective activity in CCl4-induced liver damage in a rat model. The extract of 500 mg/kg (oral dose) exhibited a significant protective effect reflected by lowering the serum levels of aspartate aminotransferase (AST), alanine aminotransferase (ALT), total serum bilirubin, and Malondialdehyde equivalent, an index of lipid peroxidation of the liver (Mohan *et al*., 2007) [14].

5.8. Ant constipation effect

Constipation is one of the most common gastrointestinal complaints worldwide. This study examined the effects of fig paste for the treatment of Loperamide-induced constipation in a rat model. For this purpose, animals were divided into one normal control group and four experimental groups (0, 1, 6, and 30 g/kg). Loperamide (2 mg/kg, twice per day) was injected intraperitoneally to induce constipation in the four experimental groups. Fig paste was administered for 4 weeks to assess its anticonstipation effects. In progress, fecal pellet number, weight, and water content were increased in the fig-treated groups as compared with the control group. Reductions in body weight and increased intestinal transit length were observed in the fig-treated groups. Fecal pellet number was reduced in the distal colons of the fig treated rats. Exercise and ileum tension increased in the experimental groups as compared with the control group. Constipation was decreased when the fig fruit was fed to rats (Lee *et al*., 2012) [11].

5.9. Hypoglycemic

The hypoglycemic effect of an aqueous extract of leaves has been demonstrated in streptozotocin-induced diabetic rats (Nicotra *et al*., 2010) [16], where weight loss was prevented in these animals. Additionally, treatment resulted in an increase in the survival index that correlated with increased plasma insulin levels. A similar activity has also been reported for the fruit of *Ficus carica* (El-Shobaki *et al*., 2010) [5].

5.10. Hypocholesterolemic activity

The leaves of fig have hypocholesterolemic activity. Chloroform extract is prepared from the aqueous decoction of fig leaves. It causes decline in the levels of total cholesterol and decrease in the total cholesterol/HDL cholesterol ratio, together with a reduction of the hyperglycemia. In addition to this, the cell content of cholesterol in HepG2 cells appreciates the reduction of blood cholesterol level in streptozotocin induced diabetic rats (Canal *et al*., 2000) [2].

5.11. Anticancer effect

Bioactive compounds like 6-O-acyl-b-D-glucosyl-b-sitosterols, i.e., AGS (acyl moiety: Palmitoyl, linoleyl, stearyl, and oleyl) were isolated from fig latex. Palmitoyl derivative of AGS acts as the most potent inhibitor for various cancer cell lines as compared with linoleyl, stearyl, and oleyl derivatives. AGS is reported for *in vitro* inhibition of DG-75, Jurkat, and DU-145 cancer cell lines. Thus, AGS is the most potent anticancer agent (Rubnov *et al*., 2001) [20].

5.12. Anti-angiogenic activity

(Mostafaie *et al*., 2010) [15] Investigated the anti-angiogenic and anti-proliferative potentials of *Ficus carica* latex extract using human umbilical vein endothelial cells (HUVECs).

The results clearly indicated that latex extracts of Ficus carica contain strong anti-angiogenic and anti-proliferative activities. Therefore, latex extract could be an ideal candidate as a potential agent for the prevention of angiogenesis in cancer and other chronic disorders.

5.13. Haemostatic effect

(Richter *et al*., 2002) [19] found that ficin (mixture of proteases) present in latex of *Ficus carica* possessed the significant hemostatic effect by shortening the activated partial thromboplastin time and the prothrombin time. This showed that the hemostatic potency of Ficus proteases was based on the activation of human coagulation factor X.

6. Conclusion

Ficus carica has emerged as a good source of traditional medicine for the treatment of various ailments such as anemia, cancer, diabetes, leprosy, liver diseases, paralysis, skin diseases, and ulcers and also have important nutritional value. It is a promising candidate in pharmaceutical biology for the development/ formulation of new drugs and future clinical uses.

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