

Amelioration in the Therapeutic Uses of *Ficus carica* Linn

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Abstract: *Ficus carica* is a lactiferous, perennial, deciduous small tree that belongs to the *Moraceae* family spread across the tropical and subtropical region. It contains various phytochemicals such as flavonoids, triterpenoids, coumarins, volatile oil, and psoralen which can fight many diseases. The pharmacological database reports on different parts of the *Ficus carica* plant have revealed significant anticancer, gastroprotective, antioxidant, antimicrobial, anthelmintic, antipyretic, nematocidal, hypoglycemic, antimutagenic activities. Traditionally almost every part of this plant was used in the treatment of many diseases such as asthma, scabies, toothache, diarrhea, chest pain, nose bleeding, gout, leprosy, spasmodic, cancer, piles, cough, leukoderma, diabetes, etc. Recently new studies have reported that it was more effective with novel drug delivery system. This review was prepared by a detailed literature survey on its pharmacognostic profile and transformation of traditional medicinal activities into modernity.

Keywords: *Ficus carica* Linn., Fig, Phytochemical properties, Anjeer.

1. Introduction:

India has a long history of traditional medicine systems based on Ayurveda, Siddha, Unani, and Homeopathy. Many conventional and herbal medicines are used as supplements to treat a variety of diseases [1]. *Ficus carica* Linn. is a plant generally known as 'Fig' which means

34 'to care, it is a fruit tree that has been cultivated since ancient times. *Ficus carica* is known by
35 several names in different languages, as shown in Table 1. The history of *Ficus carica* Linn.
36 is dating back to the Neolithic Era and it is the only plant that is mentioned in the Holy Bible.
37 In the archeological excavation remnants of *Ficus carica* Linn. have been found [2]. *Ficus*
38 *carica* Linn. consist of one of the largest genera of angiosperm having 1400 species classified
39 into 40 genera which is being cultivated for the last 11000 years back at the global level [3].
40 This review paper aims to shed light on the areas that are currently transforming the
41 traditional medicinal activities of *Ficus carica* Linn. into a modern medicine system. For this
42 review collected the literature the following databases: PubMed, Scopus, Science direct,
43 SciFinder, Google Scholar, and regional traditional herbal literature. This review concludes
44 the traditional, pharmacological, and novel application of *Ficus carica*.

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47 **2. Geographical Status**

48 *Ficus carica* Linn. is a deciduous, perennial tree widely distributed in tropical and subtropical
49 countries in the Mediterranean region especially Italy, Spain, Turkey, Greece, Portugal,
50 Algeria, Morocco, Egypt, Iran, and India [4]. In India, the area for cultivation covers the
51 states of Maharashtra, Tamil Nadu, Gujrat, Uttar Pradesh, Karnataka, and Meghalaya of
52 North-East zone covers 43 species and is considered a hotspot zone for the cultivation of
53 *Ficus carica* Linn. in India [5]. The geographical distribution of *Ficus carica* is shown in
54 figure 1.

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56 **3. Botanical Description**

57 Trease and Evans stated that before the time of Linnaeus (1707-1778) plants were known by
58 a double Latin title, but this great Swedish biologist owes the general adoption of the present
59 binomial system, in which the first name denotes the genus i.e., *Ficus* while the second one's
60 species i.e., *Carica* [6]. The taxonomical classification of *Ficus carica* is given in Table 2.
61 *Ficus carica* is a 15-20 feet tall deciduous tree with several spreading branches and a trunk
62 that is hardly ever larger than 7 feet in diameter. The Morphological Characteristics of *Ficus*
63 *carica* Linn. Listed in Table 3. The plant's root system is typically superficial and spreading.
64 The plant has single, large, alternate, bright green leaves usually up to 1 foot in length. Fruits
65 are usually shaped like pears and are axillary on leafy branchlets. A fruit contains between 30
66 to 1600 seeds, which can be large, medium, small, or even tiny. Unless they have been

67 pollinated, the numerous edible seeds are usually hollow. The distinctive nuttiness of dried
68 figs is derived from pollinated seeds. The interior is made up of a white inner ring that
69 contains a seed mass that is bound by flesh that resembles jelly [7]. Different Parts of *Ficus*
70 *carica* Linn has shown in Figure 2 and 3, respectively.

71

72 **4. Various species of Ficus**

73 There are more than 1400 species of *Ficus carica* Linn. are reported around the world. Their
74 names are mentioned below:

75 *Ficus abelii*, *Ficus abscondita*, *Ficus altissima*, *Ficus austrina*, *Ficus bambusifolia*, *Ficus*
76 *benjamina*, *Ficus boliviana*, *Ficus bracteata*, *Ficus calyculata*, *Ficus calyptrata*, *Ficus*
77 *carica*, *Ficus carinata*, *Ficus cestrifolia*, *Ficus citrifolia*, *Ficus conglobate*, *Ficus cotinifolia*,
78 *Ficus cyrtophylla*, *Ficus deltoidea*, *Ficus densifolia*, *Ficus dugandii*, *Ficus erecta*, *Ficus*
79 *flagellaris*, *Ficus funiculosa*, *Ficus fuscata*, *Ficus geniculate*, *Ficus gracilis*, *Ficus granatum*,
80 *Ficus hirusta*, *Ficus hypogaea*, *Ficus imbricata*, *Ficus lacunata*, *Ficus longifolia*, *Ficus*
81 *lyrata*, *Ficus macrophylla*, etc [8].

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83 **5. Phytochemical Constituents**

84 Phytochemicals are the chemical compounds or bioactive compounds responsible for the
85 plant's defense action against infection, or predation by microbes, insects, and pathogens.
86 Few are responsible for color, aroma, and other organoleptic properties. These are produced
87 by primary and secondary metabolites. Because of the presence of flavonoids, terpenoids,
88 volatile oil, phytosterol, and other compounds, *Ficus carica* has a variety of biological
89 activities, including antitumor, anti-inflammatory, antispasmodic, antibacterial, antidiarrheal,
90 antifungal, antidiabetic, anthelmintic, antipyretic, expectorant, gastroprotective, diuretic, and
91 antiasthmatic properties. The various phytoconstituents present in *Ficus carica* Linn. are
92 listed with the respective parts of the plant as reported in Table 4 [9].

93

94 **6. Therapeutic application**

95 Therapeutic activity or biological activity refers to the beneficial effects of a drug on living
96 organisms. The drug may not necessarily exhibit a single therapeutic activity. *Ficus carica*
97 *Linn.* possesses end no of activities for preventing, and treating a disease or conditions in
98 humans and animals are summarized in Table 5. Apart from the ethnomedicinal applications
99 *Ficus carica* Linn. is also eminent in the food industry. The various commercial products of

100 *Ficus carica* Linn. are available in the market like dried anjeer, jam, marmalade, tenderizing
101 meat, ice cream, juice, cake, delights, etc [10].

102 The plant exhibits versatility due to its tremendous properties and has achieved great
103 economic importance over the world [11]. At the moment, various advancement is being
104 done because of their multifaceted assets.

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106 **7. Current amelioration in *Ficus carica***

107 **7.1 Anticancer Activity:**

108 investigated

109 The anticancer activity of methanolic extract of the fruit and leaf *Ficus carica*. Were
110 investigated by Purnamasari et al. (2019). Fourier -transform infrared spectroscopy was used
111 to analyze the anticancer compounds isolated from the extract. MTT (3-(4,5- dimethylthiazol-
112 2-yl) 2,5-diphenyl-tetrazolium bromide) assay is used to study the effect of the methanolic
113 extract on Huh7it liver cancer cells. *Ficus carica* leaf and fruit extracts showed anticancer
114 activity with LC50 values > 635 µg/ml and >2000 µg/ml, respectively. The results showed in
115 comparison to fruit extract, leaf extract had a higher percentage of Huh7it liver cancer cells
116 apoptosis and necrosis which is demonstrated through the flow cytometer [12].

117 **7.2 Anthelmintic Activity:**

118 *Ficus carica* traditionally known as anjeer possess anthelmintic activity used as a vermifuge
119 in different states of America. The effect of plant latex was studied on albino mice naturally
120 infected with different helminth parasites such as *Syphacia obvelata*, *Vampirolepis nona*, and
121 *Aspiculuris tetrapetera*. The latex of the plant was administered by intragastric route in doses
122 of 3ml/kg/day for 3 consecutive days. The result showed that the latex of *Ficus carica* was
123 effective in the elimination of *Syphacia obvelata* (41.7%), but it was not effective in the
124 removal of *Vampirolepis nona* (8.3 %) and *Aspiculuris tetrapetera* (2.6 %). In addition to
125 weak anthelmintic efficacy, severe acute toxicity was observed with hemorrhagic enteritis
126 [13].

127 **7.3 Antioxidant and Antimicrobial Activity:**

128 The antioxidant and antimicrobial activity of *Ficus carica* leaves was evaluated by Ahmad et
129 al. (2013). Soxhlet apparatus is used for the extraction of leaves. Five pathogenic
130 microorganisms named *Klebsiella pneumoniae*, *Staphylococcus epidermidis*, *Bacillus cereus*,
131 *Enterobacter aerogenes*, and *Bacillus subtilis* were tested against the methanolic extract at
132 different concentrations (30,40,50,60 µg/ml) of *Ficus carica*. DPPH (2,2-diphenyl-1-

133 picrylhydrazyl) and agar well diffusion methods were used for invitro screening of
134 pathogenic microorganisms. The leaves extract exhibited significant antimicrobial potential
135 and antioxidant activities against all five tested bacterial strains [14].

136 **7.4 Gastroprotective Potential:**

137 The ethanolic leaf extract of the plant was used for the screening of gastroprotective activity.
138 The study was performed on male albino rats. A peptic ulcer was induced by using
139 indomethacin. The standard drug ranitidine was used as a reference. The *Ficus carica* leaves
140 extract was administered orally to rats at doses of 500 mg/kg. The result promoted a
141 significant reduction in gastric pH, and gastric defensive factors (gastric prostaglandin E2 and
142 nitric oxide) along with a significant increase in gastric mucosal lesions index, total acid
143 outputs, and pepsin activity in peptic ulcer compared with the control group [15].

144 **7.5 Anti-pyretic Activity**

145 The antipyretic activity of ethanolic leaf extract of the *Ficus carica* plant was evaluated. A
146 yeast suspension of 10 mg/kg body weight was injected subcutaneously in adult Wistar strain
147 albino rats. The rectal temperature of experimental animals was increased after 19 hours of
148 administration. Oral administration of ethanolic leaf extract at doses of 100, 200, and 300 mg/
149 kg body weight significantly reduced body temperature in a dose-dependent manner [16].

150 **7.6 Other Activities**

151 Apart from those biological activities mentioned, *Ficus carica* was also reported to have a
152 nematocidal activity that can possess the strongest nematocidal activity against some
153 *nematodes Caenorhabditis elegans, Bursaphelenchus xylophilus, and Ponagrellus redivivus*
154 [17]. The hepatoprotective activity of petroleum ether extract of *Ficus carica* has been
155 investigated on rats treated with rifampicin at the dose of 50mg/kg orally [18]. In other
156 studies, the hypoglycemic potential of the aqueous leaf extract of the *Ficus carica* plant was
157 evaluated in streptozotocin-diabetic rats [19].

158 The hypolipidemic, antibacterial, antifungal, antituberculosis, antispasmodic, antiplatelet,
159 antimutagenic, anti- herpes -simplex-virus activities were also reported in different parts of
160 the *Ficus carica* plant [20].

161 **8. Novel Applications**

162 A recent study found that *Ficus carica* fruit mucilage was used to prepare a matrix-type
163 transdermal delivery system to develop diclofenac sodium transdermal patches. The
164 developed patches had confirmed both pre and post formulation compatibility. Prepared

165 patches can be used as an alternative to intravenous administration with minimal side effects
166 [21].

167 Traditionally leaf decoction is used for the management and treatment of diabetics. A
168 scientific investigation by Kurniawan et al. prepared a *Ficus carica* leaf ethanol extract tablet
169 formulation with the help of the wet granulation method. This natural anti-diabetic tablet
170 formulation was found as alternative to synthetic anti-diabetics [22].

171 By-products of *Ficus carica* are viable sources of bioactive compounds. These bioactive
172 substances possess a wide range of nutritional benefits. Pectin and furanocoumarins are two
173 important phytochemicals that are mainly isolated from leaves and peels. These natural
174 compounds are highly demanding in the food industry as food additives, emulsifiers, and
175 colorants. The long-term continuous use of synthetic food additives possesses a lot of serious
176 side effects on the human body. The by-products of *Ficus carica* are a good substitute as food
177 additives in the food industry [23].

178 **9. Future Prospect**

179 Since ancient times, *Ficus carica* has been utilized to cure a variety of illnesses. But over the
180 time, its use underwent several alterations that were advantageous to humanity. Researchers
181 are currently looking for natural excipients for the production of various dosage forms. In the
182 last two decades, different parts of *Ficus carica* have been used as drug excipients and food
183 additives. So, there is huge scope to use *Ficus carica* as a good substitute for synthetic
184 excipients and food additives.

185 **10. Conclusion:**

186 *Ficus carica* has traditionally been used, but at present many modernizations are being done
187 so that proper and advanced benefits can be availed of these nature-given gifts. Both crude
188 extract and isolated bioactive compounds from the *Ficus carica* plant possess anticancer,
189 antioxidant, antimicrobial, gastroprotective, antipyretic, hepatoprotective, antibacterial,
190 antifungal, antituberculosis, antispasmodic, antiplatelet, antimutagenic, anti-herpes-simplex-
191 virus activities. The relevant phytochemical compounds include sterols, coumarins,
192 triterpenoids, flavanol glycosides, and fatty acids. Accumulating evidence supports the
193 traditional uses of *Ficus carica* in herbal medicine. This review provides a short overview of
194 the pharmacognostic, pharmacological, and therapeutic applications of *Ficus carica*. Thus,
195 future research investigation should focus on the clinical potential of crude extract, the
196 structure bioactivity relationship, and isolated compounds from *Ficus carica*. More clinical

197 investigations are required to advance knowledge to novel applications of phytochemicals
198 isolated from different parts of *Ficus carica*.

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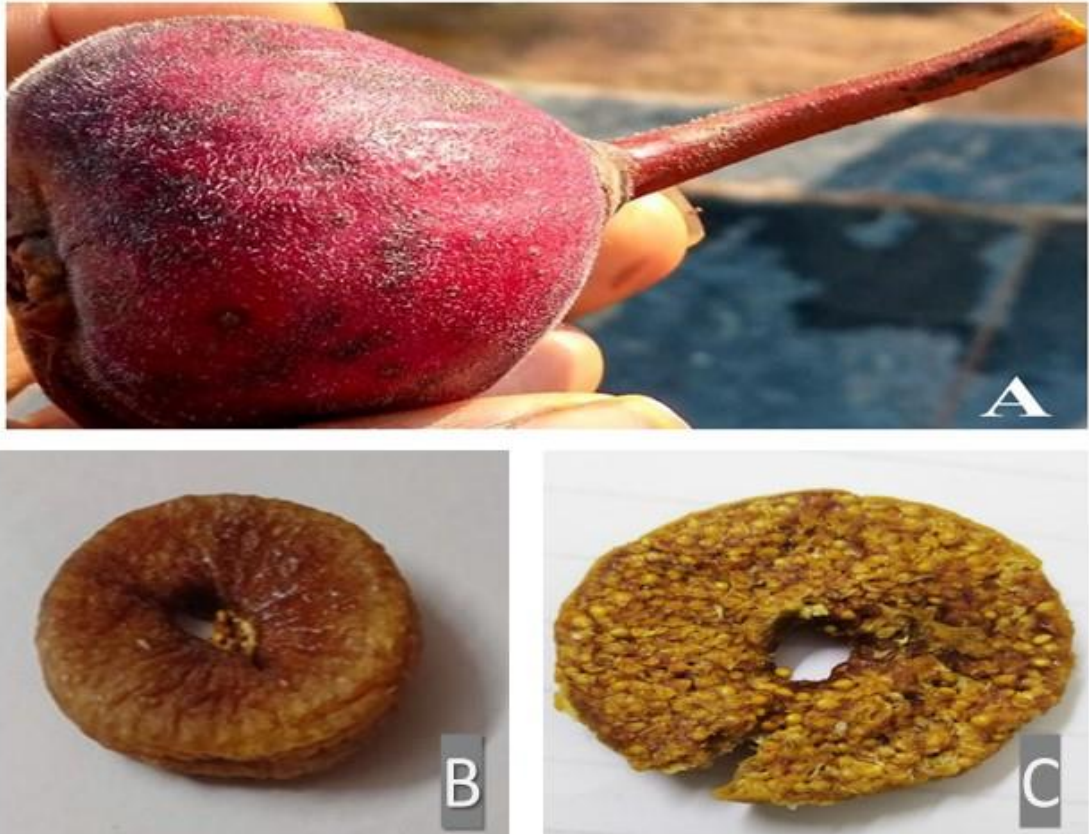
Figure 1: Geographical distribution of *Ficus carica* Linn. (Yellow stars)



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280 **Figure 2: Parts of *Ficus carica* Linn.:** A. small tree of *Ficus carica* Linn., B.
281 **Multibranched trunk,** C. Leaves of *Ficus carica* Linn. D. Unripe fruits of *Ficus carica*
282 ***Linn***

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285 **Figure 3: The fruit of *Ficus carica* Line. A. Ripe fruits, B. Dried fruits, C Inner part of**
286 **dried fruits**

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301 **Table 1: The common name of *Ficus carica* Linn. Based on language popular in**
 302 **different regions.**

Language	Vernacular Name
English	Fig
Hindi	Anjir
Sanskrit	Anjira
Bengali	Anjir
Kannad	Anjura
Tamil	Tennati
Telugu	Anjuru
Marathi	Anjra
Punjabi	Fagari
Italy	Lattarula ‘Italian Honey’
Turkey	Brown Turkey
Greece	Sacred Fig

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305 **Table 2: Taxonomic Profile of *Ficus carica***

Kingdom	Plantae
Division:	Magnoliophyta
Class	Magnoliopsida
Order	Rosales
Family	Moraceae,
Genus	Ficus
Species	F. Carica

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314 **Table 3: The Morphological Characteristics of *Ficus carica* Linn.**

Characters	Description
Plant type	Small tree
Habit	Erect, multi-stemmed, rounded, spreading
Size	Small tree: 15 to 20 ft tall, 7 ft in diameter
	Fruit: 1-3 inches in length and width
	Flower: < 1 inches
	Leaf: >6 inches in length and 3-6 inches in width
Color	Leaf: Green
	Flower: Green
	Fruits: Unripe- Green, Ripe- Black, Purple, red, Dried fruit-brownish yellow
Shape	Bark: light gray
	Stem: brown/copper
	Leaf- Hand shaped Fruit- Bell shaped
Seed	Vary greatly ranging from 30-1600 per fruit
Taste	Sweet
Root	Shallow
Latex	Present in all rupture parts of a plant

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326 **Table 4: Phytoconstituents of *Ficus carica* Linn.**

Type	Phytoconstituent
Coumarins	Umbelliferon, Phellodenol, Psoralen, Bergapten, Angelicin, Marmesin
Sterols	Stigmasterol, β -sitosterol
Triterpenoids	Oleanolic acid, Calotrophenyl acetate, Taraxasterol
Monoterpenes	Linalool, Borneol, Geraniol, Limonene, Carveol
Sesquiterpenes	Farnesyl acetate, Valeneen, Acoradiene, α -caryophyllene
Flavanol Glycosides	Rutin, Isoquercetine, Astragalin
Flavone Glycosides	Isoorientin, Cymarosides, Apigenin-rutinosides
Fatty acids	Linoleic acid, Oleic acid
Phenyl Propanoids	Eugenol, Cinnamaldehyde

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334 **Table 5: *Ficus carica* Linn. reports therapeutic activities in various diseases in humans**
 335 **and animals.**

Part of the plant	Disease or conditions
Fruit	Anemia, Skin disease, Warts, Constipation, Liver disease, Cough, Piles, Hemorrhoids, Insect stings, Gout, Leprosy, Nose-bleeding, Pyrexia, Chest pain, Asthma, Hematuria, Scabies, Toothache.
Leave	Hypocholesterolemia, Memory booster, Phototoxicity, Contact dermatitis, Jaundice, Diabetes, Bronchitis.
Bark	Inflammation, bone fracture,
Latex	Diarrhea, Expectorant, Diuretic, Piles, Corns, Stomach cancer, Warts, Skin disease, Anthelmintic
Root	Leukoderma, Ringworm infection

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