REVIEW ARTICLE

Anjīra (Ficus carica L) – A food supplement with medicinal benefits

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Abstract

Natural products and derivatives such as plants and mineral derivatives have been in extensive use as food and as medicines for ages. Āyurveda has used crude plants or plant product, singly, or as combinations for securing health benefits. Food and food products have been considered as the Primary source of maintaining health. Food and food articles have been accorded immense importance for the source of maintain and deriving health as a whole and thus have been advised as a co-entity during the treatment of an illness, described specifically as *Pathya* and *Apathya* aiding in better and faster recovery from a disease. In one of the *Āyurveda* classics, the *Kāśyapa Saṃhitā*, food is considered as *Mahābheśaja*, the supreme medicine. With the rise of the present day medicine few centuries ago, natural medicine, and diet was somewhat neglected as a part of health. However, looking at the limitations of the present modern medicine and with the rise of a new branch, Lifestyle Diseases, food items and plant derivatives have again started regaining the past glory. It is necessary to evaluate the benefits of food items on the present day parameters and study their biological activities in detail so as to reconsider and re-include and promote them into the routine diet. *Ficus carica* L. colloquially known as *Anjīra*, a common dietary fruit, is used in traditional medicine as remedies for many health problems, and its biological activities. The plant has been used traditionally to treat various ailments such as gastric problems, inflammations, blood disorders, reproductive disorders, and also as a health booster. This review paper is an attempt to relate and confirm the traditional uses and benefits of *Anjīra* on the modern scientific analysis and experiments.

Key words: *Anjīra*, *Ficus carica* L, *Āyurveda*, Medicinal food, *Vṛṣya, Rasāyana, Medhya*

INTRODUCTION

Medicinal plants, as whole or constituent parts of it, have been extensively used for their health promoting/maintaining or disease modifying/curing effect for over centuries. Indian traditional medicine, *Āyurveda*, has extensively used plant products in its natural form or other modified pharmaceutically administrable forms for health benefits.[1] These natural products have disease cure potential through modulation of physiological and biological activities. Medicinal plants and its constituents have confirmed their role in diseases prevention and treatment.[2,3] Before the branch of modern pharmaceutics evolved, the pharmacokinetics and pharmacodynamics of these pharmaco-potent drugs have been described clearly in various classical texts of *Āyurveda*, though not on the modern parameters, but on other parameters related to the host science. This includes not only its physical properties and pharmacological usages but also the shelf life of a raw or a processed product, the *Savīryatāvadhi*.[1] This is a clear indication of the advancement of pharmaceutical sciences in that era. This review, is an attempt to relate the pharmacological effects of *Ficus cariaca* generally known as fig in English or as *Anjīra* in various Indian languages or as *Falgu* in *Sanskṛta*, or as *Kśīrīvṛkśafala*, as the tree that bears the fruit is a tree which secretes latex when cut down as described in *Āyurveda*, through the researches

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carried out in the recent years and also other effects such as antioxidant, anti-inflammatory effects, and antimicrobial, anticarcinogenic, and anti-inflammatory effects.

Ficus, a member of Moraceae family covering one of the genera of angiosperms, includes approximately 800 species of trees, shrubs, hemiepiphytes, climbers, and creepers in the tropics and subtropics. Leaves of figs are traditionally used in the management of diseases such as vitiligo, diabetes, coughs, asthma, constipation, and gingivitis.[4,5] Roots are used in the treatment of leukoderma and ringworms.[6,7] Fruits have antipyretic, purgative, aphrodisiac and properties and also have shown to be valuable in treating inflammations and diseases of blood. Fruits are said to carry a nutritious value and are thus useful in treating under nutritional disorders.[8-10]

F. carica contains various valuable constituents in fruits and leaves [Table 1]. The majority species of *F. carica* contain phenolic compounds, organic acids, and volatile compounds.[5,11,12] Fruits constitute valuable ingredients such as cyanidin-3- O-glucoside, cyanidin-3-Orhamnoglucoside, saturated fat, cholesterol, and sodium, insoluble sugars, protein, Vitamin A, Vitamin C, calcium, and iron.[13] Phytochemical analysis has confirmed that the aqueous extract of ripe dried fruit contain alkaloids, flavonoids, coumarins, saponins, and terpenes.[14] The leaves have been reported to have furanocoumarins including psoralen, bergapten, xanthotoxin,[15] and triterpenes such as calotropenyl acetate and lupeol acetate.[16] The other ingredients such as phenolics, anthocyanins, fructose, glucose, and sucrose were identified[13] and the fruit, in addition, consists phytosterols.[17]

A single medicinal plant and its ingredients have multiple therapeutic activities. These plant parts mainly play therapeutic role in preventing or curing the disease due to the rich source of antioxidant.[18] *F. carica* has shown health promoting effect due to the rich source of antioxidant. A study was performed to determine the antioxidant activity, and results of the study revealed that antioxidant activity was found to be very good.[19] Antioxidative activities of water extract and crude hot-water soluble polysaccharide (PS) from fruit confirmed that both water extract and crude hot-water soluble PS showed prominent free radical scavenging activities in both extracts.[20] The PS also showed a significant increase in the clearance rate of carbon particles and serum hemolysin level. All fractional extracts of fig including that of the leaf, inhibited nitric oxide production[21] and also demonstrating anti-inflammatory effect in acute inflammation and in chronic study reduction in granuloma weight and reduction in edema.[22] It also significantly decreased the production of tumor necrosis factor-α, prostaglandin E_2, and vascular endothelial growth factor, whereas angiogenesis was significantly inhibited indicative of a strong anti-inflammatory activity by inhibiting the inflammatory mediators.[23]

Natural products and other natural products offer better options in the treatment of hepatobiliary diseases. Leaves extract of *F. carica* shows promising results on rifampicin induced hepatotoxicity showing significant reversal of biochemical, histological, and functional changes.[24]

Immunomodulation has been the most sought after effect, studied, and achieved from plants and its derivatives. *F. carica*, by administration of its fruit and leaf extract, remarkably ameliorates both cellular and humoral antibody response.[25] Thus this can be attributed to as the *Rasāyana* effect of *Anjīra*.

In a study, Tg mice were fed with dietary supplementation with 4% figs. Mice fed with control diet without figs showed significant memory deficits, increased anxiety-related behavior, and motor coordination, memory and learning skills, compared to the wild-type control mice fed same diet, or Tg mice fed on 4% fig diet supplementation.[26] It also additional beneficial effects on suppressing inflammatory

Table 1: Chief ingredients of *Ficus carica*[5]

Parts of *Ficus carica*	Constituents
Fruits	Cyanidin-3-O-glucoside, cyanidin-3-Orhamnoglucoside, saturated fat, cholesterol, sodium, insoluble sugars, protein, Vitamin A, Vitamin C, calcium, iron
Ripe dried fruit	Alkaloids, flavonoids, coumarins, saponins, sterols, fatty acids, and terpenes
Dried seeds	Fixed oil including fatty acids
Leaves	Furanocoumarins including psoralen, bergapten, xanthotoxin, triterpenes such as calotropenyl acetate and lupeol acetate
Leaves	3-O- and 5-O-caffeoylquinic acids, ferulic acid, quercetin-3-O-glucoside, quercetin-3-O-rutinoside and psoralen

Table 2: Pharmacological activity of different parts of *Ficus carica*[5] AQ1

Plants parts	Pharmacological activities
Fruits	Antioxidative, Antispasmodic, Aphrodisiac, Nephroprotective activity
Branches	Antioxidant and antiinflammatory
Leaves	Antipyretic, antiinflammatory, antidiabetic, hepatoprotective, antiangiogenic, immunomodulatory, antinematicidal, sperm parameters, inhibitor of osteoclastogenesis, effect on ischemia/reperfusion injuries
Latex	Anticancer, antibacterial, antiangiogenic, antiviral, anthelmintic,
Stem bark	Antidiabetic

cytokines. The finding confirmed that increased levels of inflammatory cytokines and eotaxin activity were decreased by administration of the diet supplements.[27] This effect is similar to the *Medhya* activity described in *Āyurveda*, exhibited by any drug classified as *Medhya*. Thus, it can be said that *Anjīra* is a nervine tonic that can be used to improve to cognitive capabilities and can also benefit in patients with behavioral disorders. The phytochemicals show cholinesterase inhibitory properties which can be utilized to promote its consumption as functional food and as a food supplement in all age groups.[28]

Anjīra has also been described as *Vṛṣya* in *Āyurveda*. Experimental studies in animals show improved sperm count, non-progressive motility of spermatozoa, and gonadosomatic index in treated testes.[29] An earlier study had concluded that ethanolic extract showed the aphrodisiac activity and this action was dose dependent.[30] Clinical studies on humans have shown improved spermatogenesis with the use of whole fruit ingestion, in patients with low sperm counts and also in those with necrozoospermia.

In another experimental study, another edible species of *Ficus*, native of Africa, *Ficus sur* showed enhancement of extramedullary erythropoiesis. Stimulation of splenic erythropoiesis by *F. sur* components is most likely mediated by hypoxia which steps up the production of erythropoietin. The hemato-stimulatory and anti-anemic potentials of these extracts can, therefore, serve as hematinics. No doubt, good, and effective hematopoietic function can be enhanced and maintained by the use of micronutrients found in plants.[31]

Loperamide-induced constipation in a rat model was studied to evaluate action of *Anjīra* as a laxative. Fecal pellet number, weight, and water content were increased in the fig-treated groups as compared to the control group. Increased intestinal transit length and reduced fecal pellet number in the distal colons were also recorded in fig-treated rats. Exercise and ileum tension was increased in the treated groups as compared to the control group.[32] A randomized, double-blind, and placebo-controlled trial was carried out to investigate the efficacy of supplementation with *F. carica* paste in constipation in humans too. Subjects with functional constipation were orally supplemented with *F. carica* paste for 8 weeks. Colon transit time was compared before and after the 8-week intervention period. *F. carica* paste supplementation was associated with significant reduction in colon transit time and significant improvement in stool type and abdominal discomfort.

DISCUSSION

Anjīra (botanically *F. carica* L.) has been in use over a long period of time as food and medicine, the noting of which can be seen from the ancient *Āyurveda,* classics such as the *Caraka Saṃhitā* and the *Suśruta Saṃhitā*. It has been not only advocated as a medicine to be used but also as a dietary component by mentioning it in the *Falavarga* of the dietary components described in these texts.[9,10] The fresh fruit of the tree should be used as a dietary component and other parts of the plant carry no dietary significance, though they possess medicinal properties and uses. Multiple therapeutic activities are exhibited by a single plant in response to their plant part used, the biochemical and phytochemical constituents and their concentration in that part. This means that though all the parts of the plant can be used for various medicinal uses. Various species of *Ficus* are used worldwide and the phytochemical composition almost remains constant for all the species with minor variations in the proportions of the constituents.[13,19]

The fruits of *Anjīra,* are considered to be *Bṛhaṇa*, that is, nutritive and helpful in disorders or undernutrition as they cause increase in weight on frequent and long-term ingestion. This not only means that these are helpful in gaining weight. The term *Bṛhaṇa*, according to *Āyurveda,* in a broader sense is not just limited to weight gain. It means the provision and supplementation of optimum nutrition at the molecular level of all the tissues. This in order leads to proper growth, development, and functioning of the tissue and consequently the system as a whole. Thus, it can also be used in debilitating diseases as a source of energy and nutrition. Figs are useful in the diseases originating out of vitiation of *Pitta* and *Kapha*, in blood disorders (*Raktaprasādana*) and disorders of reproduction (*Vṛṣya*). The *Raktaprasādana* activity is exhibited by increasing the blood indices which is due to inducement and enhancement of erythropoiesis, and also prevention of the hepatobiliary diseases. In various studies, figs have exhibited hepatoprotective activity over damage of hepatobiliary system generated out of anti-tubercular drugs, carbon tetrachloride, or various other reasons. Liver and spleen are considered to be the main sources and origin tissues of blood according to *Āyurveda.*[33] Thus, damage to these tissues would result in vitiating and damaging the blood, thus generating its disorders and in the end the diseases of various other systems of the body. Thus functional protection of the liver and spleen and maintaining its optimal potential for optimal health is necessary. Thus, it can be said that use of figs as a food supplement can help achieving health.

Similarly, in *Āyurveda*, the terminology *Vṛṣya*, is not just limited to the aphrodisiac property or is not just a term that increases the increase in libido. It means elimination of diseases related to the reproductive system, enhancement of the quality of the reproductive molecules such as the sperm and ova, though increase in libido is a minor constituent of the term *Vṛṣya. Anjīra* has been proved to be beneficial on all of these parameters. The term *Śukrakṛt* used in *Āyurveda* in reference to *Anjīra* is indicative of its function in improving the quantity and quality of sperm and aiding healthy spermatogenesis.

The anti-oxidant activity, free-radical scavenging activity, antiinflammatory activity, nephroprotective

activity, immunomodulatory activity, inhibitory activity osteoclastogenesis, and tissue protective effect on ischemia/reperfusion injuries show that the plant is useful in preventing tissue damage and tissue aging. Thus it can also be used as a *Rasāyana* (anti-ageing and rejuvenating) dietary supplement.

CONCLUSIONS

Figs are studied and used for health purposes either as a food or as a medicine, since ancient times. They are traditionally consumed fresh or after a sun-drying process. They are rich in healthy phytochemicals, namely phenolic compounds, and exhibit significant bioactivity. They have been said to have an arena of health stimulating and disease altering activity which can be now demonstrated as potent radical scavenging activity, anti-inflammatory activity, hemopoetic activity, hepato-protective activity, immunomodulatory activity, aphrodisiac activity, and a laxative activity. In addition, a dietary supplement of figs can improve cognitive capabilities and alleviate mood disorders. Because of its cholinesterase inhibitory properties one can promote its consumption as functional food and as a food supplement in all age groups.

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