

**PASSIFLORA EDULIS: A BRIEF REVIEW****Mohammed Afham V.*, Karunakar Hegde and Shabaraya A.R.**

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Article Received on
25 May 2021,

Revised on 15 June 2021,
Accepted on 4 July 2021,

DOI: 10.20959/wjpps20218-19504

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ABSTRACT

Plants have provided mankind with herbal cures for a variety of maladies for ages, and they continue to do so today. In developing nations, they play an important role in primary healthcare as medicines. In traditional systems such as Ayurveda, unani, and sidha, herbal remedies have been used to treat and cure a variety of ailments. It also protects against radiation-induced DNA damage, according to numerous studies. Passion fruit (*Passiflora edulis*) is a beautiful climbing vine from South America. Passion fruit, which originated in South America, is currently grown as an edible fruit for the food business all over the world. It's commonly used in South American folk medicine to treat anxiety, sleeplessness, asthma, bronchitis, and urinary infections. The constituents of different extracts include

flavonoids, alkaloids, cyanogenic compounds, glycosides, vitamins, minerals and terpenoid compounds. Although short-term adverse effects of crude leaf extract in human have been described, there is not any large-scale case-control study. This situation has led to questionable conclusions concerning specific health benefits or risks of *P. edulis*.^[1]

KEYWORDS: *Passiflora edulis*, Pharmacological activities, phytoconstituents.

INTRODUCTION

About half of all modern medications come from natural sources, and they play a vital part in the pharmaceutical industry's drug discovery process. The usage of plants as home medicines in India is based on local empirical knowledge of their therapeutic characteristics. Many people in India and around the world believe that consuming plant products can provide positive therapeutic effects. Plants have been the base of many traditional medicines for hundreds of years and continue to give humans with novel treatments. Plants are one of the

richest sources of phytochemicals. *Passiflora edulis* is a plant used in Ayurveda for sedative, anxiety, and hypertension, along with many other things. The genus *Passiflora* is the largest in the *Passifloraceae* family, with around 400 species. The species of this genus can be found throughout the world's mild temperate and tropical climates, but they are much less common in Asia, Australia, and tropical Africa. *P. edulis* is a widely grown plant that may be found in all tropical nations. Its anti-inflammatory, antimicrobial, lipid-lowering, anti-oxidant, and antitumor properties have been discovered in studies. The anti-inflammatory activity of *P. edulis* aqueous leaves extract is significant. Passionflower (*Passiflora edulis*) is a traditional cure for anxiety. The leaves of *P. edulis*, which have been used in folk medicine to treat anxiety and tension, are high in polyphenols, which have been recognised as natural antioxidants. The antitumor efficacy of *P. edulis* fruit decoction has been studied. In accordance with the Ayurveda, Unani, and Siddha systems, the entire plant gains a bit of medicinal benefit due to the presence of numerous bioactive phytoconstituents.^[2]

Synonyms:^[3] *Passiflora verrucifera*, *Passiflora pomifera*

Taxonomical classification

Kingdom: Plantae.

Order: Malpighiales.

Family: *Passifloraceae*.

Class: *Magnoliopsida*.

Genus: *Passiflora*.

Species: *Edulis*.

Geographic distribution

The *Passiflora edulis* is a South American native. Purple passion fruit can be found in southern Brazil, Paraguay, and northern Argentina. Purple passionfruit is commonly grown in India, New Zealand, the Caribbean, Brazil, Ecuador, California, southern Florida, Hawaii, Australia, East Africa, Israel, South Africa, and Fujian, Guangdong, and Yunnan (China), as well as in Fujian, Guangdong, and Yunnan (China) and Taiwan. It's also cultivated in the cooler highlands of Southeast Asia and Papua New Guinea.^[4]

Botanical description

Tree

Passion fruit (*Passiflora edulis* Sim.) is a perennial vine of the Passifloraceae family. The vine is woody and perennial with shallow roots and climbs with the aid of tendrils. It can grow very fast but has a relatively short life. The vines can be supported by trellises (commercial plantations) or by wires in small domestic farms or garden walls in gardens.^[5]

Leaves

Leaves are alternating, sometimes simple, entire, lobed or palmate, occasionally compound, imparipinnate; stipules germinate at the base of petioles, and are rarely absent; Axillary tendril arising from sterile pedicels.^[6] When mature, the leaves are evergreen, alternating, and profoundly three-lobed. They are 7.5–20 cm long, with a glossy green upper surface and a lighter, duller underside. The leaves, young stems, and tendrils of the yellow type, in particular, are stained with red or purple.^[5]

Fruits



Fig: 1

The fruit is nearly spherical or ovoid in shape, weighing 35 to 80 grams on average and measuring 4–7.5 cm in diameter. It has a smooth, leathery rind that ranges in colour from dark purple with faint white flecks to light yellow or pumpkin colour. When the fruit is ripe, the rind creases and adheres to a 6 mm thick white pith. A cavity contains several (up to 250) small, firm, edible black or dark brown seeds buried in double-walled, membranous sacs filled with yellow-orange, pulpy liquid. The pulp has a strong aroma and a flavour that is musky, guava-like, and sub-acid to acid.^[5]

Seeds

Seeds are abundant; funicle dilated into a pulpy cupuliform or saccate aril; The testa is crustaceous and foveolate, and it may be easily separated from the membrane endopleura, which has a longitudinal raphe.

Flowers

The flower opens around midday, which is often the warmest time of day, and pollinators transfer pollen from one flower to another while gathering nectar during this time. Between the corolla and stamens, the enormous receptacle is hollowed out like a cup or basin, and numerous filamentous or annular appendages, which can be brightly coloured and form a striking corona of remarkable variation. 3–5 free or basely connate, imbricate sepals are present on the calyx. Stamens 3–5 inserted at the base or top of the gynophore; filaments subulate or filiform, free or monoadelphous and covering the gynophore; anthers versatile, introrse, two-celled, longitudinal dehiscence. On the parietal placentas, the superior ovary is unilocular, with 3–5 connected carpels containing many or many anatropous ovules.^[6]

Phytochemistry

Polyphenols, triterpenes, and their glycosides, carotenoids, cyanogenic glycosides, polysaccharides, amino acids, essential oils, microelements, and so on are all important components of *P. edulis*. The most commonly reported substances are luteolin, apigenin, and quercetin derivatives. Above all, passion fruit is high in nutritionally beneficial substances such as vitamin C, dietary fibre, B vitamins, niacin, iron, phosphorus, and others.^[7]

Traditional and medicinal uses

P. edulis has long been utilised in Indian traditional medicine to treat a variety of diseases. In the food industry, *P. edulis* is the most commonly used species for flavouring and juice. The fruit is eaten to relieve constipation and is used as an emetic. The fruit's pulp is both a stimulant and a tonic. It has been utilised as an ethnic medication to treat a variety of infectious diseases caused by bacteria, fungi, viruses, mycobacterium, and protozoa. Leaf extracts have long been utilized to treat symptoms of alcoholism, anxiety, migraine, nervousness, and sleeplessness. Asthma, bronchitis, and whooping cough were thought to be treated with a drink made from the flower. The herb is used as a heart tonic, moderate diuretic, digestive stimulant, and treatment for urinary infections in traditional medicine. Passion fruit seed oil has been used as a massage oil and a stimulating lubricant. It has been used in the treatment of hypertension, menopausal symptoms, and infant colic in South

America as a sedative, diuretic, anthelmintic, antidiarrheal, stimulant, and tonic. For the treatment of diarrhoea and hypertension, fresh leaves of *P. edulis* are cooked in a small amount of water and the extract is drunk. In Nigeria, leaf infusion has been used to treat hysteria and insomnia. The leaves are applied on the head for giddiness and headache; a decoction is given in biliousness and asthma.^[8]

Pharmacological Activities

AntiOxidant activity

Antioxidants are abundant in the aqueous extract of *P.edulis* leaves. They were discovered to be high in polyphenols, which have been described as natural antioxidants. They could lower oxidative stress because of their antioxidant strength and reduced lipid peroxidation. Ex-vivo iron-induced cell death was reduced, as measured by lactate dehydrogenase leakage, and protein damage caused by iron and glucose was well prevented.^[9]

Antiinflammatory activity

In the experimental model in vivo, the aqueous extract of *P.edulis* leaves, as well as two derived fractions (butanolic and aqueous residue), showed substantial anti-inflammatory activity. This identifies a distinct inhibitory profile upon cell migration, including myeloperoxidase activity, nitric oxide, interleukin-1 beta, and macrophage inhibitory protein-2 levels in the air pouch exudate, as well as myeloperoxidase activity, nitric oxide, interleukin-1 beta, and macrophage inhibitory protein-2 levels. Among the different kinds of compounds already reported for *P.edulis* leaves (e.g. triterpenes, saponins, cyanogenic glycosides), the C-glycosides of flavonoids are possibly involved, considering that they are the predominant compounds in *P.edulis* leaves and also considering the anti-inflammatory properties described for some of these compounds. Lutein, isoorientin, and other luteolin-derived C-glycosides have been demonstrated to inhibit thromboxane and leukotriene production in vitro.^[10]

Antidiabetic activity

The fruit of *P.edulis* has been discovered to have anti-diabetic properties. The presence of phenols and flavonoids in *passiflora edulis* may be responsible for its hypoglycemic action. Blood glucose and glycated haemoglobin levels were significantly reduced after 60 days of supplementation with 30g/day of *passiflora edulis* flavicarpa fruit peel flour in type II diabetic patients. The presence of fibres, such as pectin, which forms a viscous mixture, can alter gastric emptying time, increase satiety, and delay the absorption of simple

carbohydrates; additionally, the ability to form complexes with bile salts can increase cholesterol excretion. Passion fruit has a significant content of iron, potassium, zinc and manganese. The mechanism is due to the presence of fiber, tannins and phenolic compounds which reduces the digestion and absorption of carbohydrates, increased the sensitivity of muscle and adipose tissue to insulin.^[11]

Spermicidal activity

The spermicidal activity of aqueous extract of *Passiflora edulis* was discovered. After incubation of the spermatozoa with *P. edulis* extracts for 5 minutes, a significant fall in the pH of the treated samples was seen, which was connected with a significant decrease in motility and viability. The evident drop in pH value in the samples evaluated before the treatment could explain the immediate immobilisation action of the *P. edulis* extract in spermatozoa. The activity of dynein ATPase, an enzyme responsible for spermatozoa motility, has been shown to be inhibited by acid media. Furthermore, the acidity of the *P. edulis* extract would be useful when used as a spermicidal product, because the acid environment formed in the reproductive female system might prevent the growth of dangerous germs while also protecting typical vaginal flora.^[12]

Antimicrobial activity

Carbohydrates, glycosides, flavonoids, resins and balsams, alkaloids, and phenolic chemicals were found in all of the plant components studied in a phytochemical investigation of *Passiflora edulis* (Sims) (leaf, stem, and fruits). Tannins were found in the leaf and fruit extracts but not in the stem, whereas saponins were found in the leaf and stem but not in the fruit. Terpenes were not found in any of the plant's parts. The antimicrobial activities of the leaf, stem and fruit (hexane, water, ethyl- acetate and methanolic) extracts were screened against two gram positive bacteria, *Bacillus subtilis* and *Staphylococcus aureus*, and four gram negative bacteria *Pseudomonas aeruginosa*, *Salmonella paratyphi*, *Klebsiella pneumoniae* and *Escherichia coli*, using the well- in- agar method. All the extracts (hexane, water, ethyl- acetate and methanolic extract) showed antimicrobial activity against the pathogenic bacteria tested. Hexane extracts had the best antibacterial activity of all the extracts tested against all of the bacteria in this investigation, and the impact was significant. Statistical analysis also showed that the antimicrobial activity was dependent on the type of solvent used for extraction as well as the part of the plant used.^[13]

Anxiolytic activity

Several species of *Passiflora* have been employed widely as a folk medicine because of its sedative and tranquillizer activities. Phytochemical analysis showed that the content of flavonoids of the aqueous extract of *P. edulis* is responsible for the anxiolytic activity. The aqueous extract of *Passiflora* induces anxiolytic-like effects in rats without disrupting memory process.^[14]

Antiviral effect

Antiviral activity was discovered in aqueous and alcoholic extracts of *Passiflora edulis* leaves. They affect the herpes simplex viruses 1 and 2 (HSV-1 and HSV2), as well as the varicella-zoster virus (VZV). When compared to the aqueous extract of *P. edulis* leaves, the ethanol extract efficiently prevented HSV-1, HSV-2, and VZV infection of Vero cells in vitro. Its antiviral activity could be attributed to its impact on various stages of the viral infection cycle: (a) a strong interaction between the virus and the fraction in the case of HSV-1 and HSV-2, (b) an inhibition of viral adsorption/ penetration into the host cells and (c) a significant delay in the production of infective viruses inside the infected host cells.^[15]

Antihypertensive activity

Orally administered methanol extract of *Passiflora edulis* or luteolin (50 mg/kg), one of constituent polyphenols of the extract, significantly lowered systolic blood pressure in spontaneously hypertensive rats. The extract contained 20 mg of luteolin and 41 mg of luteolin-6-C-glucoside per gramme of dry weight. It also contains gamma-aminobutyric acid (GABA, 2.4 mg/g dry weight by LC-MS/MS or 4.4 mg/g dry weight by amino acid analysis), an antihypertensive substance. Since the extract contained a relatively high concentration of GABA, the antihypertensive effect of the extract in the hypertensive rats might be due mostly to the GABA-induced antihypertensive effect and partially to the vasodilatory effect of polyphenols including luteolin. The diet of spontaneously hypertensive rats supplemented with the purple passion fruit peel (PFP) extract, a mixture of bio flavonoids, phenolic acids, and anthocyanins at 50 mg/kg significantly lowered systolic blood pressure by 12.3 mm Hg and markedly decreased serum nitric oxide level by 65% compared with the control group. In a 4-week randomised, placebo-controlled, double-blind trial, the PFP extract-treated group had significantly lower systolic and diastolic blood pressure than the placebo group. The patients reported no negative side effects. After 9 hours of incubation in the presence of PFP extract (20 mg/ml), no hepatotoxicity was seen in a rat liver toxicity assay. Hepatoprotection

was also found in the PFP extract against chloroform (1 mmol/L)-induced liver damage. The findings suggested that the PFP extract's antihypertensive action is mediated in part by nitric oxide regulation. The results also suggested that the PFP extract may be offered as a safe alternative treatment to hypertensive patients.^[4]

Antiasthmatic activity

A novel mixture of bio flavonoids was found in purple passion fruit peel (PFP) extract. The prevalence of wheeze, cough, and shortness of breath was dramatically reduced in the PFP extract group, whereas the placebo group showed no change. Supplementation with purple passion fruit peel extract resulted in a significant increase in forced vital capacity, but placebo had no impact. The forced expiratory volume at 1 s of those treated with PFP extract, on the other hand, showed no significant improvement. Results suggested that PFP extract may be safely offered to asthmatic subjects as an alternative treatment option to reduce clinical symptoms.^[4]

CONCLUSION

Passiflora edulis from passifloraceae family is native to south America. Purple passion fruit can be found in southern Brazil, Paraguay, and northern Argentina. It has been cultivated and escaped in tropical and subtropical places all over the world. Polyphenols, triterpenes, and their glycosides, carotenoids, cyanogenic glycosides, polysaccharides, amino acids, essential oils, microelements, and so on are all important components of *P. edulis*. It has a long history of use in the treatment of alcoholism, anxiety, migraines, nervousness, and sleeplessness. It has anti-diabetic, antibacterial, antimicrobial, antioxidant, anticancer, antihyperlipidemic, anti-inflammatory, and antiviral properties. Apart from that, numerous studies have been conducted on this plant, which has a wide range of pharmacological properties.

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