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Carica papaya - A medicinal plant of great importance: A short review

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Abstract

Carica papaya belongs to caricaceae family and it is commonly known as papaya. *Carica papaya* L. is a popular and important fruit tree in tropical and subtropical parts of the world. The fruit is healthy and delicious and the whole plant parts including fruit, root, bark, peel, seeds and pulp are also known to have medicinal properties. The many benefits of papaya are owed due to high content of vitamin A, B and C, proteolytic enzymes like papain and chymopapain which have antiviral, antifungal and antibacterial properties. *Carica papaya* is used in ayurvedic medicines from very long time. It is used as anti-inflammatory, antioxidant, diuretic, antibacterial, abortifacient, vermifuge, hypoglycemic, antifungal activity, antihelminthic and immunomodulatory etc. Scientific evidences suggest their versatile biological function that supports its traditional use in different diseases. Phytochemical studies shows that plant *Carica papaya* contains mainly alkaloids carpaine, pseudocarpaine, tannins, flavonoids, carcin, gamma terpene, glycoside carposides, sugars.

Keywords: *Carica papaya*, chemical compounds, plants, bioactivities

Introduction

The papaya belongs to a small family-Caricaceae, having four genera in the world. The genus *Carica* Linn., is represented by four species in India, of which *C. papaya* Linna. is the most widely cultivated and best-known species. The taxonomical classification includes kingdom (Plantae), order (Brassicales), family (Caricaceae), genus (*Carica*), species (*C. papaya*). Common names include papaya, pawpaw, papaw, papita. Papaya (*Carica papaya* Linn.) is well known for its nutritional as well as medicinal value since long time. Papaya is a powerhouse of nutrients and is available throughout the year. It has three powerful antioxidant vitamin C, vitamin A and vitamin E ^[1]. The minerals, magnesium and potassium, vitamin B pantothenic acid and folate and fiber. It is such a marvelous plant, possesses various medicinal properties making it unique among other 22 species of family Caricaceae. It is believed to be originated in the tropics of the Americas, perhaps in southern Mexico and neighbouring Central America. It is polygamous specie and can be specified only at the time of flowering ^[1]. Different parts contain different enzymes: unripe fruit (papain, chymopapain), fruits (β-carotene, carotenoids, cryptoxanthin, monoterpenoids, and linalool), roots (carposides), seeds (papaya oil, glucosinolates, benzyl isothiocyanate), leaves (Zn, Mn, Fe, K, minerals), shoots (flavanoids, kaempferol, myricetin, minerals) ^[2]. The seeds can be used as pepper because it has a peppery taste when dried in a dehydrator and ground in a mortar with a pestle ^[2]. Different Parts have Medicinal Uses as latex which is used as Anthelmintic, cure diarrhoea, pain of burns and topical use, bleeding haemorrhoids, stomachic, whooping cough where Ripe fruits can be used as stomachic, digestive, carminative, diuretic, dysentery and chronic diarrhea, expectorant, sedative and tonic relieves obesity, bleeding piles, wounds of the urinary tract, ringworm and skin. Leaves were used as vegetables, jaundice, urinary complains, urinary tract infection and gonorrhoea, dressing wounds, anti-bacterial activity, vermifuge in colic, fever, beriberi, abortion, asthma. Flowers: Emmengogue, jaundice, febrifuge and pectoral properties and Stem bark: was used as antifungal, and antihelmintic ^[3, 4]. This short review gave the importance of *Carica papaya* as an important medicinal plant.

Chemical compounds

Fruits

Protein, fat, fibre, carbohydrates, minerals: calcium, phosphorous, iron, vitamin C, thiamine, riboflavin, niacin, and carotene, amino acids, citric and malic acids (green fruits), volatile compounds: linalool, benzyl isothiocyanate, cis and trans 2, 6-dimethyl-3,6 epoxy-7 octen-2-

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ol, Alkaloid, α ; carpaine, benzyl- β -D glucoside, 2-phenylethyl - β -D-glucoside, 4-hydroxy-phenyl-2 ethyl- β -D-glucoside and four isomeric malonated benzyl- β -D-glucosides [5].

Juice

N-butyric, n-hexanoic and n-octanoic acids, lipids; myristic, palmitic, stearic, linoleic, linolenic and cis-vaccenic and oleic acids [6].

Seed

Fatty acids, crude protein, crude fibre, papaya oil, sinigrin, Carpaine, benzylisothiocyanate, benzyl glucosinolate, glucotropacolin, benzylthiourea, hentriacontane, β -sitosterol, caricin and an enzyme myrosin, leaves related alkaloids, flavonoids, saponins, tannins, cardiac glycoside, anthraquinones and cardinolodes are present [5].

Root

Carposide and enzyme myrosin.

Leaves

Alkaloids carpain, pseudocarpain and dehydrocarpaine I and II, choline, carposide, vitamin C and E [5].

Bark

β -Sitosterol, glucose, fructose, sucrose, galactose and xylitol [5].

Latex

Proteolytic enzymes, papain and chemopapain, glutamine cyclotransferase, chymopapains A, B and C, peptidase A and B and lysozymes [5].

Nutrient contents of the papaya

Papaya is a major fruit crop worldwide that is primarily consumed as fresh fruit. Papaya fruits consist mostly of water and carbohydrate, low in calories and rich in natural vitamins and minerals, particularly in vitamins A and C, ascorbic acid and potassium [6].

Bioactivities

Antioxidant activity

The methanolic extract of unripe fruits of *C. papaya* was tested for its effect on activities of some antioxidant enzymes which includes glutathione peroxidase, glutathione transferase (GST), glutathione reductase, catalase and glucose-6-phosphate dehydrogenase in mice treated with a orally dose of 100 mg/kg. There is significant increase in the activities glutathione reductase, GST, GPx, glucose-6-phosphate dehydrogenase due to the ethyl acetate fraction. Significant decrease in GPx was observed in kidney following administration of ethyl acetate fraction. It was suggested that quercetin and β -sitosterol may be responsible for the antioxidant potential [7].

Anti-hypertensive activity

The ethanolic extract of ripe fruit of *C. papaya* was used for the anti-hypertensive activity. The study suggested that the unripe fruit of *C. papaya* had a potent anti-hypertensive activity [8].

Wound healing activity

The aqueous extract of *C. papaya* fruit [100 mg/(kg.d) for 10 d] for wound healing property in streptozotocin-induced

diabetic rats using excision and dead space wound models. The aqueous extract shows 77% reduction in the wound area when compared to 59% contraction to wound of the controls. Thus the result suggested that the aqueous extract of *C. papaya* had a potent wound healing property [9].

Anti-tumor activity

The aqueous extract of *C. papaya* leaves (0.625-20 mg/mL) exhibits anti-tumor activity. The extract significantly inhibited the proliferative responses of solid tumor cell lines derived from cervical carcinoma (Hela), breast adenocarcinoma (MCF-7), hepatocellular carcinoma (HepG2), lung adenocarcinoma (PCI4), pancreatic epithelial carcinoma (Panc-1) and mesothelioma (H2452) in a dose dependent manner [10].

Anthelmintic

The dried papaya seeds given as elixir with honey have shown significant effect on the human intestinal parasites, without significant side effects. Benzylisothiocyanate, present in seeds is the chief anthelmintic [11-13].

The latex of papaya has anthelmintic efficacy against *Heligmosomoides polygyrus* in experimentally infected mice, which suggests in potential role as an anthelmintic against potent intestinal nematodes of mammalian hosts [14]. It has also anthelmintic activity against natural infection of *Ascaris suum* in pigs and found to be 100% effective at the dose of 8 g/kg body weight [15, 16].

Antimicrobial activity

The aqueous extract of *C. papaya* leaves and roots at different concentrations (25, 50, 100, 200 mg/mL) showed antimicrobial activity against some human pathogenic bacteria using the agar diffusion method [17].

Anti-inflammatory activity

The ethanolic extract of *C. papaya* leaves in rats using carrageenan induced paw oedema, cotton pallet granuloma and formaldehyde induced arthritis models. The ulcerogenic activity of the extract was also investigated. The result showed that the extract at the dose of 25-250 mg/kg p.o exhibited significant reduction in the paw oedema in the carrageenan test. The extract produced slight mucosal irritation at higher doses [18].

Immuno-modulatory activity

Chemical constituents of the *C. papaya* seed extract and its bioactive fraction were examined in vitro using lymphocyte proliferation assays and complement-mediated hemolytic assay [19].

Conclusion

Papaya plant is mainly used as the food ingredient throughout the world because of its fruits and its nutritive values. The plant showed that the plant's leaves, stem, fruits and seeds also have different chemical constituents such as Alkaloids flavonoids, saponins, tannins, cardiac glycoside, anthraquinones and cardinolodes etc. many of the pharmacological activities has been done on the papaya plants.

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