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Review Article

A review of *Carica papaya*'s geographical origins and pharmacological activitiesMohit Kumar¹, Gaurav Kumar¹, Girendra Kumar Gautam^{1,*}, Zubair Ali Rona¹, Ravi Kumar²¹Shri Ram College of Pharmacy, Muzaffarnagar, Uttar Pradesh, India²Shri Ram Group of Colleges, Muzaffarnagar, Uttar Pradesh, India

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ABSTRACT

Carica papaya (L.) is a tropical fruit that is widely produced and obsessively consumed, both for its delicious flavor and for its numerous medicinal benefits. *Carica papaya* is a tropical fruit that ranges in colour from orange red to yellow orange. The entire plant was used as medicine, including the fruit, leaves, roots, peel, bark, seed, and pulp. Papaya is the common name for this plant, and Papita is the Hindi name for it. It is now cultivated all over the world and used as an attractive tree in gardens. It was first introduced to India in the 17th century. Due to the presence of phenolics, flavonoid, and alkaloids as the active ingredients, papaya is recognised for its antioxidant, antibacterial, anticancer, antifertility, antiinflammatory, antiulcer, antidiabetic, and hepatoprotective properties, among others. phytochemicals that are important Many commercial goods made from diverse plant components are available on the market and are used for a variety of applications. This review discusses the fruit's origins and briefly examines its nutritional and pharmacological properties.

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1. Introduction

Carica papaya is a fruit which is having a good taste and juicy texture. Its belongs to the family of caricaceae having genous *Carica papaya* is scientifically known as *Carica papaya* Linn.^{1,2} Papaya plant are grown in numerous parts of the world including India, South Africa and Australia. Papaya is a tree which has short life and it also know as Indian tree for ancient time. It fruits help embittered and appearance. Papaya is first genetically modified fruits. This is consumed by human being for dehydration and many nutritional requirements. Papaya is the best source of appetable or digestive agent.¹ Carica papaya tree was first identified by Spanish author by the year of 1535 in Europe described G.H.de Oviedo, in his book.² The *Carica papaya* US National Academy of discipline in 1978 approximation

humankind postharvest loss of papaya something range 39 to 99% (National Academy of science 1978) by evaluate the compost scared away by many division of the population.³ It is cultivation and collection of *Carica papaya* for fruits. *Carica papayas* is favored by the citizens of the tropics of cancer as breakfast, *Carica papaya* as constituent in jellies type, protect and cooked in many ways. Papaya juice used to cure cancer, tumors, warts, indurations of the skin. Leaves of papaya are used for a homemade poultice into nervous pain.⁴ Latex part of the leave is used as anti-helminthics and some type of bacterial infection bacteria. Extract of papaya obtained from the root used for the anti bacterial activity. Extract present in the chemical constituents such as carpaine and pseudocarpaine.⁵ *Carica papaya* Linn., is originated cultivation in Mexico and all over the tropics and sub-tropics region.⁶ Papaya is a medicinal plant which is mostly used for improve health

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in developed and developing country. Demand of medicinal plant is significantly increase.⁷ *Carica papaya* can be terminating that the juice likely protective effect on the hepatic organ (like liver) and kidney against alcohol.⁸ The papaya leaf extract for treatment dengue infected patient and role of therapeutic.⁹ Therefore as a primary step, the present analysis to [ADME&T] adsorption, distribution, metabolism, excretion, and toxicity properties.¹⁰

2. Geographical source of *Carica papaya*

Carica papaya L. fruits and crops are cultivation in tropical and subtropical world zone. Universal over 6.8 million tones something of papaya fruit was obtain in 2004 on about 389,990 hectare. In 2004 *Carica papaya* was cultivated in 47% in united state America, in 30% Asia and it also cultivated in 20-22% in Africa. Brazil is the city of world which is shows largest papaya industry for his continues growth.¹¹ *Carica papaya* is originated in Mesoamerica, like in southern Mexico. *Carica papaya* was introduced plantation selection in India from Malaysia in the 16th century. Australia, Hawaii, Philippines, Srilanka and south Africa, papaya is a species to not easy to identify weather it is a male and female the height of *Carica papaya* tree is 2 to 10 meter.¹² *Carica papaya* is manufacture a pear shaped.¹³



Fig. 1: Papaya tree.

3. Taxonomy, Morphological character of *Carica papaya* Botanical Description

3.1. *Papaya plant*

It is large having height 20-30 feet. Leaves are very large in size up to 2-3 feet and the stem are hollow, tan brown and light green in colour has diameter of 8-10 inches. *Carica papaya* is a polygamous species that's means it's hard to identify.¹⁴ papaya has present of trunk which is found in the top of tree which is look like umbrella canopy of palmately lobed leaves.¹⁵ The most important fruit is the pawpaw (*carica papaya* Linn.) family of caricaceae with 22 and more species.¹⁶

3.2. *Papaya fruit*

Fruit are oval in shape has filled with central seed cavity it borne in auxiliary on the stem, weight of fruit about 1 to 3 kg. And papaya color is green unlike ripe it turning yellow or red orange. Fresh fruit yellow orange to salmon at maturity. Because of it is melon having a middle seed cavity.

3.3. *Papaya flowers*

It is dioeciously or hermaphroditic obtain only male, (hermaphroditic) bisexual flowers. Whereas female flower are pear outline or shape. The most plant are self pollinated thus the male papaya flower is smaller as a compare to female flower While bisexual flowers are sub cylindrical.



Fig. 2: Papaya fruit

Flower are introverted or before previous of three character. Ovary position is superior Female and bisexual flower are semisolid, ivory white and borne on short pediculesin leaf axils, along the main stem. A male *Carica papaya* is known by the smallest flower borne on long glowering.

3.4. *Papaya leaves*

Papaya Leaves are greenish to yellowish colour has several of benefits it may helpful to treat dengue, malaria and various viral disease.¹⁷



Fig. 3: Papaya flower

3.5. Chemical constituent of *Carica papaya*

- Fruit:** The fruit of *Carica papaya* L. (Papaya) rich in vitamin A, B, C, has also as constituent carbohydrate, proteins, alkaloids (carpaine and pseudocarpaine), proteolytic enzymes (papain and quimiopapain). Volatile compound linalool, benzylisothiocyanate, cis and trans 2, 6-dimethyl-3,6 epoxy -7 octen-2-ol. Alkaloid, a carpaine.¹³ Carotenes, fibers, organic acid, citric acid and malic acid (green fruit).
- Juice:** α -tactopherol, squalene), phytol and mixture phytosterol such as campesterol, N -butyric, n-hexanoic and n-octanoic acids, lipids.⁸
- Seeds:** The seeds is a rich source of proteins (27.8% undefeated, 44.4% defeated) and crude fiber (22.6% undefeated, 31.8% defatted).
- Roots:** Carposides and an enzymes myrossin, 3, 7, 11, 15,-tetramethyle -2-hexadecen-1-ol (37.78%).
- Leaf s:** Alkaloids carpain, flavonoid kaempferol, phenol ferulic acid, carposide, vitamin C and E.
- Barks:** Glucose, fructose, sucrose, xylitol, β -sitosterol.
- Latex:** Papain, chemopapain, lysozymes peptidase A and B.⁴

3.6. Synonyms of Papaya

4. Phytochemical Analysis of (*Carica papaya*) leaves

The phytochemical analysis of *Carica papaya* leaves display the presence of alkaloid, saponin, tannins and glycosides, the plant also can be characterized by various

Table 1: Indian Synonyms of *Carica papaya* Linn.¹⁸

Language	Region	Names
1. Hindi	Haryana, Delhi	Papaya, Papita, pawpaw.
2. Bengali	West Bengal	Melon tree, Pepe, Papita
3. Malayalam	Kerala	Omakai
4. Punjabi	Punjab	Papita
5. Marathi	Maharashtra	Papai
6. Tamil	Tamil Nadu	Pappali
7. Kannada	Gujarat	Papaya
8. Gujarati	Karnataka	Pharangi
9. Rajasthani	Rajasthan	Eerankari

Table 2: Name of papaya in various countries.

Country	Names
1. India	Papita
2. Holland	Tree melon
3. France	Papaya
4. Australia	Pawpaw
5. Brazil	Mamao
6. UK	Papaya ,Pawpaw

Table 3: Different species of *Carica papaya* Linn.

1. <i>Carica candamarcensis</i>	<i>Carica monoica</i>
2. <i>Carica Mexicana</i>	<i>Carica weberbaueri</i>
3. <i>Carica caudate</i>	<i>Carica omnilingua</i>
4. <i>Carica cauliflora</i>	<i>Carica palandensis</i>
5. <i>Carica chilensis</i>	<i>Carica parviflora</i>
6. <i>Carica horovitziana</i>	<i>Carica spruce</i>
7. <i>Carica cundinamarcensis</i>	<i>Carica pubescens</i>
8. <i>Carica dodecaphylla</i>	<i>Carica pulchra</i>

pharmacological activity and large spectrum of therapeutic actions. *Carica papaya* leaves suppress, saponins, tannins, flavonoid, alkaloid (such as Mayer, Wagner) and glycosides. It is have the alkaloid carpaine, pseudocarpaine and dehydrocarpaine.¹⁹ Phytochemical screening standard test (test for alkaloids) by done. Test for alkaloid test use for dragendroff reagent.²⁰

4.1. Pharmacology activity of *Carica papaya*

The *Carica papaya* plant numerous medicinal activities approve like anti-hypertensive, anti-inflammatory, antioxidant, antifungal, hepatoprotective, anti fertility, hypoglycemic activity, anti -sickling, anti- tumor and anti-ulcer activity.

4.1.1. Anti- cancer effect of papaya leaf extract

Cancer is the most spread disease in worldwide it arises due to uncontrolled division of cell and significance cause of death. Many type of cancer are found like colon, liver, stomach, cervix, lung and breast cancer reported in human being. In recently there are many type of

treatment are available in overall globe to cure cancer but there are no specific therapy are available due to many adverse effect. Treatment available are surgery, radiotherapy, immunotherapy, vaccinations etc., some drugs example are vincristine, vinblastine, carboplatin, cisplatin etc., in many researcher and study shows alternative treatment afinst cancer with or without ADR. based on Many study plant extract and many derivative show treatment of cancer with less side effect. Researcher reported some patient are suffered from blood liver lungs and stomach cancer showing after consumption of papaya leave extract (solution) increase rate of survival of the patient .

4.1.2. Antioxidant properties

It free radicals are “reactive oxygen species” presence of unpaired electron. Antioxidants are free radical scavenging activities. Of *Carica papaya* flower were identified by calculate standard method 1,1-diphenyl -2-picryl-hydrazyl (DPPH).¹⁸ And papaya seeds reported is rich polyphenols, flavonoid, and tannins.²¹ Sample preparation Dissolve in methanol (1 mg/ml) and all test sample was accurately weight.²²

4.1.3. Anti-inflammatory effect of *Carica papaya*

The body of the inflammation is a difficult trail, possess mechanism against pathogen protective that is symptoms such as pain, inflammation and release to the prostaglandin mediator.²³ Components of *Carica papaya* has own anti inflammatory effects. Aqueous extract of papaya seeds considerably decreased NO radical through 69.4% in a cell loose assay in vitro. Meanwhile, the aqueous extract at a concentration of 150µg/mL inhibited the release of lysosomal enzymes and stabilized human RBC membrane through 22.7%. On the contrary, the extract exhibited has least effective hydroxyl radical scavenging action (69.1%) at a concentration 95 mg/mL and lowering strength at a concentration of 20 mg/mL. Meanwhile, Aruoma and co-workers confirmed that fermented papaya preparation (FPP) inhibited H₂O₂-caused phosphorylation of Akt and p38, in addition to down regulating MAPK pathway. An in vivo have a look at confirmed that *Carica papaya* leaf extract at a dose of 1.32 µg/mL proven immune modulation properties.²⁴

4.1.4. Antihypertensive activity of *Carica papaya*

Many researchers have pronounced cardiovascular results associated with *Carica papaya* L. (Caricaceae – *C. papaya*). The extract of *Carica papaya* stems and leaves has confirmed in vitro Angiotensin converting enzyme inhibitory activity. Which is found that the methanolic extract of leaves of *C. papaya* elicited vasorelaxant activity on the mesenteric mattress and the aorta rings of rats? The papaya extract elicited an antihypertensive impact

withinside the DOCA-salt model.²⁵ An antihypertensive assay turned into carried out on hypertensive rats and albino Wister rats have been dealt with enalapril a reference drug (10 mg.kg-1), the methanolic extract of *C. papaya* (100 mg.kg-1; two times a day) for 30 days. When it is concluded, antihypertensive outcomes caused with the aid of using the methanolic extract of papaya plant have been much like the ones of enalapril reference drug. It turned into concluded that the class of flavonoid compounds, rutin, nicotiflorin, quercetin, clitorin, and manghaslin in methanolic extract has possessed the antihypertensive efficacy.²⁶

4.1.5. Anti-fungal activity of *Carica papaya*

Papaya has the capability to give activity against fungal diseases. An ethanolic extract of seeds, leaves, and unripe fruit was turned into a study with the aid of Quintal and his coworker in opposition to antifungal activity. Extraction time, solvent, and extraction ratio become noted. The end result confirmed that a growth in time and maximum ratio is extra effective and offers a satisfactory yield. The effectiveness of the ethanolic extract with regard to time was measured qualitatively. Phytochemical research demonstrates the presence of some flavonoids, terpenes, and alkaloids are present in leaf extract.²⁷ *Carica papaya* L. leaves and seeds are acknowledged to comprise proteolytic enzymes (papain, chymopapain), alkaloids (carpain, carpasemine), sulfurous compounds (benzyl isothiocyanate), flavonoids, triterpenes, natural acids, and oils. Extracts from one-of-a-kind papaya tissues have been proven to be bioactive. Aqueous extracts of leaves and seeds are acknowledged to have antifungal activity towards *Colletotrichum gloeosporioides*. Aqueous and natural extracts of seeds have antihelminthic activity towards *Caenorhabditis elegans*.²⁸

4.1.6. Anti-fertility activity of *Carica papaya*

In few study adult and pregnant rats both showed anti-fertility effects. The action of several fruit component was studied. Studies reveled that unripe papaya fruit interrupted the estrous cycle and resulted as the fruit ripened. it also has an anti-implantation activity reported²⁷. An oral dosage of 100mg/kg body weight of crude ripe papaya seeds for eight days demonstrated the germinal epithelium and germ cells have degenerated, and the number of leyding cells has decreased, as well as the presence of vacuoles in the tubules.²⁹

4.1.7. Antimalrial and to treat dengue *Carica papaya*

Whole plant of *Carica papaya* is used to cure many diseases dengue fever is one of them "Commencing on studies of Dr. Sanath Hettige, who conducted the research on 70 dengue fever patients, said papaya leaf juice helps increase white blood cells and platelets, normalizes clotting, and repairs the liver" tea are made by papaya leave are used to

treat malaria. antimalarial and antiplasmodial activity also reported on *Carica papaya* linn but exact mechanisms still not understandable and not scientifically proven.³⁰

5. Conclusion

Papaya (*Carica papaya* Linn.) is well-known around the world for its unique and mystical medical powers. The root, leaves, fruit, and juice of the papaya tree have all been used as medical cures. The pharmacological activities of *Carica papaya* are numerous. It contains numerous vitamins, minerals, and enzymes. Papaya's proven pharmacological actions (such as anti-inflammatory, antioxidant, antibacterial, anti-fertility, anti-cancer, and anti-malarial) make it suitable for treating a variety of disorders, and certain commercial medications are also available to treat dengue fever, for example. Currently, papaya fruit is used to make a variety of processed foods, including jam, jelly, pickles, candied fruit, puree, concentrate, and canned slices/chunks. In addition, fruit waste peel is used in cosmetics and pharmaceuticals. This review is all about the pharmacologically effect of *Carica papaya*.

6. Acknowledgement

All authors have equally contribution.

7. Conflict of Interest

The authors declare no relevant conflicts of interest.

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None.

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