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A Review Article: Pharmacological uses and Phytochemistry Studies on *Carica papaya*

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ABSTRACT:

For a very long time, the papaya has been valued for both its nutritional, and therapeutic activity. The various traditional medical systems, including Ayurveda, are well aware of the therapeutic benefits of papaya fruit and other parts. Its many portions have been described in numerous traditional literatures for various disease situations, including cold, fever, headache, swellings, gonorrhoea, itches, jaundice, eczema, asthma, chicken pox, bronchitis and whooping cough. Over the past forty years, numerous outstanding studies on biological functions and therapeutic uses have been documented, establishing it as a significant nutraceutical agent. Scientific research has been done on the *Carica papaya* Linn. leaf for a number of therapeutic purposes, including antibacterial, antioxidant, antipyretic, insecticidal, antimicrobial, and anti-mollusk properties. Given this, Leaves have been investigated using variation of cutting-edge approach, as well as phytoextraction of heavy metals and phytoremediation of particle pollution. The past several decade, A numbers of read up on phytoconstituents and the chemical make-up of leaves have been published. The presents-day review seeks to allow a overviews of *Carica papaya* Linn. pharmacognostic phytochemical and pharmacological studies.

Keywords: *Carica papaya* is a medicinal plant, anti-dengue, pharmacological, ayurvedic, and phytochemical activities.

1. INTRODUCTION:

For a very long time, medicinal plants have been well-used to treatments of large varieties of disorder. There have been reports of considerable diuretic action in plants that are frequently used for the conventional treatment of renal disorders. Additionally, medicinal herbs can be an effective tool in the management of hypertension. The use of plants as diuretics agents in the treatment of dysuria and hypertension was highlighted in earlier studies. Currently, the treatment of congestive heart failure (CHF), Hypertantion and other cardiovascular illnesses involves the use of commercial synthetic Diuretics(Adam, et al; 2018).

Diuretics are a helpful and varied class of drugs widely used to treat with heart failure, hypertension and electrolyte imbalances. This review will look at recent data from randomised trials after summarising the key properties of diuretics, such as their indication, side effects, mechanism of action and duration of action (George, et al; 2014).

Understanding and appreciating their pharmacokinetics and pharmacodynamics is especially crucial because they are frequently used to treat patients who are at a high risk for problems. Although the numerous diuretic medications on the market have unique pharmacokinetic and pharmacodynamic characteristics that influence responsiveness and have the potential to have a variety of negative effects. They are frequently used in a stereotypical way by doctors, which decreases their efficacy and may increase their negative effects. Although there are various uses for diuretics, this study will concentrate on using them to treat edoema and the growth of extracellular fluid, (ECF) volume (Ellison, et al; 2019).

Every plant in existence has potential as a source of medication. Although the amounts of these are active elements vary from structure to structure in plants, It is usually possible to remove them from all plant structures. For medicinal usage, the parts chosen include, The rhizome, leaf, seed, flower, bulk, fruit, stem, root, and barks because, It is recognised that these parts have the highest concentration of the active ingredients (Kafaru, et al; 1994).

2. PLANT PROFILE:

Figure: Displays the *Carica papaya* plant profile.



Plant profile of *Carica papaya* on Display: (A). Papaya tree, (B). Ripe papaya (Tarun, et al; 2015)



2.1 Common names: (Vijay, et al; 2014)

Papaya and pita in Hindi

Papaya, pepe, and papaya in Bengali

pappali in Tamil

Papai in Marathi

Papaya in Gujarati

Eerankario from Rajasthan

2.2 Botanical Classification of plant: (Ashish, et al; 2021)

Domain	Flowering Plant
Kingdom	Plantae
Sub Kingdom	Tracheobionta
Class	Magnoliopsida
Sub Class	Dilleniidae
Super Division	Spermatophyta
Phylum	Steptophyta
Order	Brassicales
Family	Caricaceae
Genus	Carica
Botanical Name	<i>Carica papaya</i> Linn.

The tropically plants of the *Carica papaya* Linn. (family: Caricaceae) is native to the tropic of the Americas but, Now generally cultivated in others tropical areas of the earth. It produces an edible, year-round fruits that resembles a melon. A fast-growing, upright papaya tree with a trunk that is around 20 cm in diameter and abundant latex, the *Carica papaya* grows to a height of 7-8 metres. Its leaves are up to 80 cm long, soft, lobulated (radiating like the fingers of the hand), grouped close to the top of the plant, and long-petiolated. Its fruit is a huge, rectangular to almost globose or



pyriform, yellow to greenish-orange berry that can scale in size from 7.5 cm in wild species to 45 cm in cultivars, with flesh that is tasty, juicy, and orange in colour. *Carica papaya* is known to include alkaloids, captian, nicotine, flavonols, tannins, terpinenes, and enzymes including papain and chymopapain, according to phytochemical studies

In many part of the earth, Individual portions of the plants are used to cure various human and veterinary ailments. For instance, in traditional Asian remedy, The latex is work like as a abortifacient, an anti-septic for wound-dressing, and the treatment for dyspepsia, while in traditional African medicine, the root infusion is said to be effective for treating piles, yaws, and venereal infections. In addition to being used to cure malignant growths, latex is used to treat ringworm and psoriasis. Its fruit and seed extracts have been found to have strong antibacterial effects on the bacteria *Shigella flexneri*, *E. coli*, *Staphylococcus aureus*, *Bacillus cereus* and *Bacillus cereus*. Additionally, It has been shown that the crushed seeds have antiparasitic properties against *Dirofilaria immitis* and *Entamoeba histolytica*. Additionally, reversible antifertility, sedative, muscle relaxant, and purgative effects of the plant extracts have been found. The unripe fruits of the *Carica papaya* have been shown to have anti-diabetic properties in numerous independent animal and human investigations. Despite the plant seed's extensive and long-standing use in the conventional care of diabetes and obesity, there are little studies on its hypoglycemic and/or anti-diabetic properties (Adeneye, et al; 2009).

Carica papaya Linn., often called Pawpaw, papaya, papayas, or Papye, is a members of the plants *Caricaceae* family. It is thought to be a nutrient powerhouse. It is the first fruit to be genetically modified, and it grows all year round. Our forefathers typically utilised its leaves to treat a variety of illnesses, such as viral illnesses, malaria, dengue, jaundice, and dengue fever. In pharmacological research, young leaves are



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more significant because their contents are more potent than those of mature leaves (Fatima, et al; 2018).

The *Carica papaya Linn.*, one of the 22 species in the family Caricaceae, is a wonderful plant with a variety of medicinal characteristics. It is thought to have started in the Americas' tropics, possibly in adjacent Central America and southern Mexico. It is a polygamous species and can only be identified during the blossoming season. It shows sex reversal to varied degrees. This plant's many parts are use to treatments for the varieties of illness (Apurva, et al; 2018).

A big, tree-like as a plant, The papaya has a single stems that can reach height of 5 to 10 m (16 to 33 ft) and is covered in spirally arranged leaves only at the top of the trunk. The leaf are enormous, 50–70 cm in diameters, And have 7 lobes that are deeply palmately lobes. Unless it is lopped, the tree is often unbranched. The leaves' axils sprout blooms, which develop into substantial fruit. When the fruit is tender and skin has turned from amber to oranges, The papaya fruit is ripes (Aravind, et al; 2013).

The metabolic cage is set up to collect urine and faeces samples efficiently and separately. It is crucial to carefully measure the total sum of feeds and waters consumed as well as to gather urine or faeces samples separately in biomedical and nutritional investigations. A poly-carbonate upper chamber with grid floor and funnels in the lower chambers make up a standard metabolic cage. Outside the cage is where you put the feeder (Iva Morolt Banek, and Jagoda Rosa, et al.,2019).

3. PHARMACOGNOSTICALSTUDIES:

Papaya trees are typically tiny, single-stemmed, and have few branches. It has grown from 130 cm to the point where it must be limited to the top and spirally structured. The lower trunk has noticeable fruit and leaf scars. The papaya leaves are big, 50-70 in diameter, upto 90 cm with long, and strongly palmate lobed with 7 lobes. The tree



is dioecious and has latex in every area of it. With five components that connect to the petals of the male flower, the flower is highly dimorphic. In the female flower, a superior ovary and five control patterns are still visible. The leaf axils still contain the male and female flower. The sweet-smelling flower is still blooming at night. It produces big berry-like fruits is 15-45 cm in length, and 10-30 cm in diameter.

To create quality standards, the leaf of the *Carica papaya Linn.* was examined and documented. Collenchyma, parenchyma, epidermis, sclerenchyma, xylem-phloem, and Pith are all present, According to the microscopic analysis. Petroleum ether extract has a 20.44% successive extractive value. Comparatively, the mean Ash values were 16.72% (based on a total analysis), 3.25% (acid-soluble Ash), and 6.05%. (water-soluble Ash). In the leaf powder, spheraphides, rhomboidal calcium oxalates crystals, and starch grains were in great number. The stomatal index was discovered to be 32.55 ± 3.42 , the vein-termination numbers to be 3-4, and the palisade ratio to be 13.64 ± 1.56 .15 (Apurva, et al; 2018).

4. APPEARANCE:

This plant has a latex-filled weak stem that is soft and unbranched. There are several leaf joints and long stalks on this white latex. It is around 20 metres tall and is growing quickly. It has a single grassy stem. The size of a leaf is 2.5 feet wide and 1-3 feet long. A leaf's diameter is around eight inches, and it has several lobes. Its interior is hollow and ranges in colour from green to brown.

4.1 Fruit

The fruit is oblong and has a central chamber for the seeds that resembles a melon. Fruit is a parent that occasionally grows alone but more frequently appears in groups on the main stem. The *Carica papaya* fruit ranges in weight from 0.5 lbs. to 20 lbs. Green, as opposed to mature fruit that turns yellow or red-orange. At maturity, The flesh turns from orange-yellow to salmon, (pinkish orange). The substantial edible portion is encircled by the enormous central seed chamber. Depends on the cultivator



and temperature, Each fruits will mature in five to nine month. Fruits from the plant is ready in 6 to 12 months.

4.2 Flower

Due to the separation of the male and female flowers, papaya plants are dioecious. Because it also produces a bisexual flower, it is sometimes referred to as trioecious. The blossoms are white and have a feminine slant. It has a stigma but few stamens and is born on the shorts pendulum next to core stems. The position of bisexual flowers is the same as that of the female flower, but they are tubular in shape, with anthers that are between the sizes of the male and female flowers whereas the female flower is shaped like a pear. The ovary is further advanced. Because bisexual plants may pollinate themselves, they are preferable to a single flower. The male flower is smaller than the female flower and is born on a long stalk.

5. PHYTOCHEMISTRY ANALYSIS OF PLANT:

Diuretic activity was attributed to a wide variety of phytoconstituents, including alkaloids, tri-terpenoids, phenolics, glycosides coumarins, tannins etc. These plant-based phyto-constituents have the appropriate pharmacological effects on the body, which causes them to function as a natural diuretic. Triterpenes of *Taraxacum officinale* and *Abutilonindicum*, *Tribulus Terrestris*, Saponin of the *Asparagus-racemosus*, sesqui-terpene lactones of the *Taraxacum-officinale*, *Tribulus Terrestris*, glycosides of the *Opuntia ficus-indica*, and *Moringa-oleifera* may all play a role in the mechanism action of diuretic properties. Phenolics (flavonoids and tannins) (Garima, et al; 2013).

alkaloids, Saponins, flavonoids, phenols, cardiac glycosides, phlobatinins, anthocyanosides, tannin and , anthraquinones were all found in the *Carica papaya* according to phytochemical investigation (Imaga, et al., 2010).



The papaya is a nutrient-dense fruit that contains just a little quantity of protein and an equal number of minerals, phosphorus, calcium, and iron. As well as Vitamins-A and Vit-C and is higher level in “*papain*” enzyme (Kumar, et al., 2013).

6. PHARMACOLOGICAL ACTIVITIES OF CARICA PAPAYA:

Both of the production and concentration of urinary electrolytes are increased by natural diuretics. The concentration of sodium and potassium ions in urine is raised by *Mimosa pudica*, *Costus-speciosus*, *Phyla-nodiflora*, *Tylophora-indica*, *Lepidium sativum*, *Withania coagulans*, *Thespesia populnea* and *Phyllanthus fraternus*. Due to an increase in potassium levels in the discharge urine. Extracts of the *Rungia-repens*, *Spilanthes-acmella*, and *Tribulus-alatus*, all function as a high-ceiling diuretic (loop diuretics). They may also increase the risk of hypokalemia (Vivek et al; 2011).

Carica papaya plant has been produced different type of properties such as, Antioxidant, diuretic, anthelmintic, anti-tumor, wounds healing, antimicrobial, anti-fungal, anti-inflammatory, anti-fertility, histaminergic, antiamoebic, anti-hypertensive, and hepato-protective, results on smooth muscle, anti-malarial, hypoglycemic, immune-modulatory, antiulcers, and anti sickling activities (Tarun, et al; 2015).

6.1 Diuretics

When rats were administered aqueous roots of papaya extract, Given orally at the concentration of 10 mg/kg, their discharge urine production significantly increases, and their urine electrolytes discharges profile resembled those of hydrochlorothiazide (Sripanidkulchai, et al; 2001).

6.2 Anti-malarial

The papaya rind extract in petroleum ether, With concentration scales from 0.05 to 1000 g/mL. The aqueous extract had strong anti-malarial activity (Bhat, et al; 2001).



6.3 Anti-sickling

In vitro, the methanolic extracts of papaya at a concentration of 10 mg/mL, decreased hemolysis and safeguarded erythrocytes membrane integrity during the osmotic stress (Imaga, et al; 2009).

6.4 Anti-ulcer

Rats with chemically, alcohol-induced gastric mucosa damaged and red blood cell (RBCs) oxidative stress were protected by the crude aqueous seeds extract of papaya at doses of 50 mg/kg and 100 mg/kg, p.o. Rats given 100 mg/kg of the extract considerably lowered their stomach acidity (Tolunigba, et al; 2012).

6.5 Hepatoprotective

Carica Papaya dried fruit aqueous with ethanol extract for its hepato-protective activities in rats, Against of Carbon-Tetrachloride-induced hepato-toxicity in rat. The *Carica papaya* extracts from the crude aqueous (250 mg/kg, p.o) and ethanols (250 mg/kg, p.o), demonstrated considerable hepatoprotection by reducing, The level of alkalinephosphatase, serum-bilirubin, SGOT, and SGPT (Sadeque, et al; 2010).

6.6 Anti-inflammatory

The mature *Carica papaya* seeds cotton pallet granuloma ethanolic extract (100/mL, p.o), shown substantial antiamoebic action against *E. Histolytica* in rat, with chemically, Carrageenan-induced paw-edema (Tona, et al; 1998).

7. MEDICINAL VALUE OF PAPAYA:

There have been claims that the papaya plant's sections have therapeutic benefits for treating a variety of human diseases and disorders (Okeniyi, et al., 2007).

Natural compounds found in twig tissues and the leaf bark of papaya plants have potent anti-tumor and pesticidal capabilities (Jaiswal, et al., 2010).



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Papaya Leaves tea or extract is reputed to be a tumor-crushing substance (Kalou, et al; 2011).

The papaya's dark, dried leaves are the most effective tonic and blood purifier, Whereas the fresh, green leaf of papaya is an antiseptic. It removes micro-organisms from the intestines, more so than (Only an intestinal tract in good health can absorb minerals and vitamins particularly vitamin B12) (Dev and Iqbal, et al; 2015).

The green unripe papaya has a therapeutic benefit due to its anti-septic properties. The tea, prepared with the fresh, green leaves of the papaya help in the digestion disorder, and against all help to treatment of the diseases such as chronic indigestion, anti-dengue, arteriosclerosis, anti-malaria, obesity, high blood pressure (Saran and Chaudhary, et al; 2013).

Two significant physiologically active substances found in papaya chymo-papain and papain are used often to treat digestive issues. It demonstrated how pepsin breakdown can be aided by papain, chymo-papain, glycine and endopeptidase, all of which are produced from papaya. Other papaya active ingredients include lipase, a hydrolase, which is thought to be a "naturally immobilized" biocatalyst because of its strong association with the water-insoluble portion of crude papain. Folk medicine claims that papaya latex can treat exterior burns and scalds as well as dyspepsia.

The Carica Papaya fruits and seeds are good anti-amoebic agents and anti-helminthic. For making tea, dried and ground leaves are sold. The leaf decoction is also given to horses as a purgative and is used to treat the genito-urinary system.

To induce abortion, unripe and semi-ripe Fruits of *Carica papaya* are consumed or applied topically to the uterus. Although eating unripe or semi-ripe papaya fruits while pregnant may be risky, doing so while eating mature fruits poses no danger. Papaya's latex is used as an anti-amoebic, male and female anti-fertility, anti-microbial, anti-histamine anthe-lmintic, anti-malarial, anti-fungal, hepato-protective



and Immuno-modulatory. Its ripe fruits, unripe fruits, flower, seeds juice, steam bark, and root, leaves, seed are also used in these ways (Rajasekhar, et al; 2017).

8. ADVANTAGES OF CARICA PAPAYA:

8.1. Leaves

The very most useful elements of *Carica papaya* plants is their leaves since, They exhibit a broad scale of their actions. Leaves of papaya can be used as a medicine to treated conditions like acne on the skin, as well as to ease nausea and menstrual cramps. Additionally, it stimulates appetite.

8.2 Fruit

The papaya fruit is a factory for vitamins and minerals. It displayed antifungal properties. It is a green-fruit whose milky-juice contains the enzyme "*papain*." Native Americans employ this enzyme as a digestive system treatment.

8.3. Seed

The seeds of papaya plants has a pungent, spicy flavour. Its occasionally substituted for black pepper. The nephroprotective effect of seeds is dose-dependent. Compared to the flash, its seed has higher potential. It is effective against infections caused by *Staphylococcus*, *Salmonella*, and *E. coli*. Seeds purify the liver, get rid of parasites in the intestines, and protect the kidneys. It also lowers fever and typhoid while defending against skin irritation. So, it's not meaningless to claim that it's only a means to increase the amount of enzymes in your diet.

8.4. Peel

In many cultures, papaya peel is used as a therapeutic ingredient. Like a cosmetic, it is used as a moisturiser, skin lightener, and sunscreen. If lemon peel, vinegar and lemon juice are put in to the scalp care for 20 minutes, Then clean It helps to combat dandruff. The peel has a calming effect on the muscles. Ancient cultures held the view that add on the vinegar and papaya oil to the water-bath would refresh the body, nourish the skin, and help with pain alleviation.



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8.5. Root

Papaya root has medicinal properties that are employed in herbal treatments for renal illness. For both men and women, kidney disease is a hazardous condition. This is so that the kidneys, one of our essential organs, can filter out poisons and other hazardous chemicals from the food and liquids we consume. The second advantage of papaya root is that it can be used as a medication to help cure rheumatism, a condition that is more common among elderly individuals. We also employ papaya blossoms, leaves, and roots in a variety of other situations (Urooj, et al; 2018).

9. PAPAYA DURING PREGNANCY:

Papain and chymopapain, Two of the primary components of papaya, are found in the latex and have teratogenic and abortifacient (able to cause an abortion) effects. As *papain* functions similarly to *oxytocin* (pitocin) and *prostaglandin* Hormones, which are well knowns to induce work in the birth mothers, This may increase the likelihood of uterine contraction and have detrimental effects on both the health of mothers and their unborn children.

Additionally, The latex can oedematize and haemorrhage placentas, leading to serious pregnancy problems and typically an early delivery (Tarun, et al; 2015).

10. CONCLUSION:

Due to its extraordinary and enchanted therapeutic capabilities, papaya (*Carica papaya* Linn.) is well-known throughout the world. Papaya trees, including their roots, leaves, fruit, and juice, were used in medicine as treatments. There are many different pharmacological effect of *carica papaya*. including an extensive variety of vitamin, enzyme and mineral. The biologically functions of Papaya plants and few of its adverse effect are summarised in this article. For the elimination of mineral deposits from the urine, use roots or their extracts.



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