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Traditional and Medicinal Uses of *Carica papaya*

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Papaya, botanical name *Carica papaya*, is an lozenge tropical fruit, often seen in orange-red, yellow-green and yellow-orange hues, with a rich orange pulp. The fruit is not just delicious and healthy, but whole plant parts, fruit, roots, bark, peel, seeds and pulp are also known to have medicinal properties. The many benefits of papaya owed due to high content of Vitamins A, B and C, proteolytic enzymes like papain and chymopapain which have antiviral, antifungal and antibacterial properties. *Carica papaya* can be used for treatment of a numerous diseases like warts, corns, sinuses, eczema, cutaneous tubercles, glandular tumors, blood pressure, dyspepsia, constipation, amenorrhoea, general debility, expel worms and stimulate reproductive organs and many, as a result *Carica papaya* can be regarded as a Neutraceutical. The present article reviews the pharmacological uses of *Carica papaya* and side/toxic effects. *Carica papaya* contains an enzyme known as papain which is present in the bark, leaves and fruit. The milky juice is extracted, dried and used as a chewing gum for digestive problems, toothpaste and meat tenderizers. It also contains many biological active compounds including chymopapain and papain which is the ingredient that aids digestive system, and again used in treatment of arthritis.

Keyword: *Carica Papaya*, Papain, Chymopapain, Neutraceutical

1. Introduction:

Papaya is a powerhouse of nutrients and is available throughout the year. It is a rich source of threes powerful antioxidant vitamin C, vitamin A and vitamin E; the minerals, magnesium and potassium; the B vitamin pantothenic acid and folate and fiber. In addition to all this, it contains a digestive enzyme-papaintha effectively treats causes of trauma, allergies and sports injuries. All the nutrients of papaya as a whole improve cardiovascular system, protect against heart diseases, heart attacks, strokes and prevent colon cancer. The fruit is an excellent source of beta carotene that prevents damage caused by free radicals that may cause some forms of cancer. It is reported that it helps in the prevention of

diabetic heart disease. Papaya lowers high cholesterol levels as it is a good source of fiber.

Papaya effectively treats and improves all types of digestive and abdominal disorders. It is a medicine for dyspepsia, hyperacidity, dysentery and constipation. Papaya helps in the digestion of proteins as it is a rich source of proteolytic enzymes. Even papain-a digestive enzyme found in papaya is extracted, dried as a powder and used as an aid in digestion. Ripe fruit consumed regularly helps in habitual constipation. It is also reported that papaya prevents premature aging. It may be that it works because a poor digestion does not provide enough nutrients to our body. The fruit is regarded as a remedy for abdominal disorders, The skin of papaya works as a best

medicine for wounds. Even you can use the pulp left after extracting the juice from papaya as poultice on the wounds. The enzymes papain and chymopapain and antioxidant nutrients found in papaya have been found helpful in lowering inflammation and healing burns. That is why people with diseases(such as asthma, rheumatoid arthritis, and osteoarthritis) that are worsened by inflammation, find relief as the severity of the condition reduces after taking all these nutrients. Papaya contributes to a healthy immune system by increasing your resistance to coughs and colds because of its vitamin A and C contents. Papaya included in your diet ensures a good supply of vitamin A and C that are highly essential for maintaining a good health. Carica papaya constituents exhibit alkaline combination, as with borax or potassium carbonate and they have showed good results in treatment of warts, corns, sinuses, eczema, cutaneous tubercles and other hardness of the skin, and also injected into indolent glandular tumors to promote their absorption. Green fruits of papaya are used to treat high blood pressure, dyspepsia, constipation, amenorrhoea, general debility, expel worms and stimulate reproductive organs.

2. Biological Sources

Botanical Name: Carica papaya

Family Name: Caricaceae

Common Name: Papaya, Paw Paw, Kates, Papaw

Part Used: Leaves, Fruits, bark, leaves

3. Nutritional Value

The papaya, papaw, or pawpaw is the fruit of the plant *Carica papaya*, the only species in the genus *Carica* of the plant family Caricaceae. It is native to the tropics of the Americas. The papaya is a large, tree-like plant, with a single stem growing from 5 to 10 m (16 to 33 ft) tall, with spirally arranged leaves confined to the top of the trunk. The leaves are large, 50–70 cm in diameter, deeply palmately lobed, with seven lobes. The tree is usually unbranched, unless lopped. The flowers appear on the axils of the leaves, maturing into large fruit. The fruit is ripe when it feels soft and its skin has attained amber to orange hue.

These nutritional values of papaya help to prevent the oxidation of cholesterol. Papaya is rich in iron and calcium; a good source of vitamins A, B and G and an excellent source of vitamin C (ascorbic acid). The extracts of unripe *C. papaya* contain terpenoids, alkaloids, flavonoids, carbohydrates, glycosides, saponins, and steroids.

Table 1: Papaya, raw Nutritional value per 100 g

Energy	163KJ
Sodium	3 mg
Potassium	257
Phosphorus	5
Magnesium	10
Iron	0.10
Calcium	24
Vitamin C	61.8
Folate (vit. B ₉)	38
Vitamin B ₆	0.1
Niacin (vit. B ₃)	0.338
Riboflavin (vit. B ₂)	0.05
Thiamine (vit. B ₁) 0.04 mg	0.04
Vitamin A	328
Protein	0.61
Fat	0.14
Dietary fibre	1.8
Sugars	5.9
Carbohydrates	9.81

Table 2: *Carica papaya* is a pack of enzymes

Phytoconstituents	<i>Carica papaya</i> part
Enzyme Papain, chymopapain	Unripe fruit
Carotenoids B carotene, crytoxanthin	Fruits
Carposide	Roots
Glucosinolates Benzyl isothiocynate, papaya oil	Seeds
Minerals Ca, K, Mg, Zn, Mn, Fe	Shoots, leaves
Monoterpenoids Linalool, 4-terpinol	Fruits
Flavonoids Myricetin, kaemferol	Shoots
Alkaloids Carpinine, carpaine, vitamin C and E	Leaves

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G and an excellent source of vitamin C (ascorbic acid). The extracts of unripe *C. papaya* contain terpenoids, alkaloids, flavonoids, carbohydrates, glycosides, saponins, and steroids.

a. Proteolytic Enzymes

Papaya contains several unique protein-digesting proteolytic enzymes including papain and chymopapain.

b. Papain

This enzyme is similar to pepsin, a digestive enzyme in our body.

c. Chymopapain

A drug made from chymopapain used to be very popular in treating slipped disk.

Both papain and chymopapain can help lower inflammation and improve healing from burns.

d. Carpaine

The alkaloid, Carpaine, slows the heart rate in humans and thus reduces blood pressure. Its action is similar to the drug prescribed for heart patients, digitalis. The alkaloid is reported to be able to kill worms and amoebas.

e. Lycopene

Papaya has an abundance of cancer fighting lycopene. It is a key intermediate in the biosynthesis of many important carotenoids, such as beta-carotene and xanthophylls.

f. Fibrin

Another useful compound not readily found in the plant kingdom is Fibrin. It reduces the risk of blood clots and improves the quality of blood cells, optimizing the ability of blood to flow through the circulatory system. Fibrin is also important in preventing stroke.

4. Pharmacological Activity of Each Division of *Carica Papaya*

Whole *Carica papaya* has a unique pharmacological uses

4.1 Leaves

Papaya leaf has a numberless of benefits. In some parts of Asia, the young leaves of the papaya are steamed and eaten like spinach.

a. Dengue fever

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.

b. Cancer Cell Growth Inhibition

Recent research on papaya leaf tea extract has demonstrated cancer cell growth inhibition. It appears to boost the production of key signaling molecules called Th1-type cytokines, which help regulate the immune system.

c. Antimalarial and Antiplasmodial Activity

Papaya leaves are made into tea as a treatment for malaria.^[15] Antimalarial and antiplasmodial activity has been noted in some preparations of the plant,^[15] but the mechanism is not understood and not scientifically proven

d. Facilitate Digestion

The leaves of the **papaya plants** contain chemical compounds of karpain, Substance which kills microorganisms that often interfere with the digestive function.

Additional Benefits of Papaya Leaves

- **As an acne medicine**
- **Increase appetite**
- **Ease menstrual pain**
- **Meat tenderizer**
- **Relieve nausea**

4.2 Fruit

Papaya fruit is a rich source of nutrients such as provitamin A carotenoids, vitamin C, B vitamins, lycopene, dietary minerals and dietary fibre. Danielone is a phytoalexin found in the papaya fruit. This compound showed high antifungal activity against *Colletotrichum gloeosporioides*, a pathogenic fungus of papaya

a. Laxative

Ripe papaya fruit is laxative which assures of regular bowel movement.

b. Indigestion

The milky juice which is tapped from the green, mature fruit while still in the tree contains an enzyme known as "papain". People use this in the preparation of different remedies for indigestion.

c. Void the Heart Attack or Stroke

The folic acid found in papayas is needed for the conversion of homocysteine into amino acids such as cysteine or methionine. If unconverted, homocysteine can directly damage blood vessel walls, is considered a significant risk factor for a heart attack or stroke.

4.3 Seeds

The black seeds of the papaya are edible and have a sharp, spicy taste. They are sometimes ground and used as a substitute for black pepper.

a. Nephro-Protective Activity

In wistar rats nephro-protective activity was observed in dose related manner. Concentration of urine and creatinine were evaluated.

b. More Potent

The papaya seeds are very pungent and peppery, making them almost unpalatable. However the seeds seem to have more potent medicinal values than the flesh.

- Papaya seeds have antibacterial properties and are effective against E.coli, Salmonella and Staphylococcus infections.
- Papaya seeds may protect the kidneys from toxin-induced kidney failure.
- Papaya seeds can eliminate intestinal parasites.
- Papaya seeds help detoxify the liver
- As a skin irritant to lower fever
- Cure for piles and typhoid
- anti-helminthic and anti-amoebic properties

Dried papaya seeds actually look quite similar to peppercorns and can be used in just the same way. Grinding a couple over a meal, especially protein rich meals, is a simple way to add extra

enzymes to your diet and improve your digestive health.

4.4 Peel

Papaya peel is often used in cosmetics. The papaya peel can also be used in many home remedies.

a. Sunscreen And Soothing Slave

The presence of vitamin A helps to restore and rebuild damaged skin. Applied papaya peel used as skin lightening agent. When peel mixed with honey and applied it can act as soothe and moisturizers the skin.

b. Fight Dandruff

The papaya vinegar with lemon juice can be applied to the scalp for 20 minutes prior to shampooing to fight dandruff.

c. Muscle Relaxant

Adding papaya oil and vinegar to bath water, along with essential oils like lavender, orange and rosemary can be nourishing, refreshing and relaxing, and can work as a pain reliever and muscle relaxant.

4.5 Roots

Juice from papaya roots is used in some countries of Asia to ease urinary troubles. Papaya leaf when dried and cured like a cigar, is smoked by asthmatic persons. An infusion of fresh papaya leaves is used by person to expel or destroy intestinal worms. Fresh young papaya are also used to remedy colic, a certain stomach disorder or cramp.

A decoction formed by boiling the outer part of the roots of the papaya tree in the cure of dyspepsia.

4.6 Latex



Fig 1: Fruits of Papaya

The milky sap of a unripe papaya contains Papain and chymopapain. chymopapain was approved for intradiscal injection in patients with documented herniated lumbar intervertebra discs and who had not responded to "conservative therapy". Vitamins and traces of an alkaloid called Carpaine have also been found in the latex. Apart from natural oils, the seeds of the fruit also contain carbohydrates, carpasemine, benzyl senevol and a glucoside. Papain is also used to treat commercial beer, to degumm natural silk, as a meat tenderizer and in the production of chewing gums. Cosmetically it is used in Shampoos and in a number of face-lifting operations. In humans capaine slows down the heart and thus reduces blood pressure.

5 Medicinal Value

a. Colon cancer

The fiber of papaya is able to bind cancer-causing toxins in the colon and keep them away from the healthy colon cells. These nutrients provide synergistic protection for colon cells from free radical damage to their DNA.

b. Anti-Inflammatory Effects

Protein enzymes including papain and chymopapain and antioxidant nutrients found in papaya; including vitamin C, vitamins E, and beta-carotene, reduce the severity of the conditions such as asthma, osteoarthritis, and rheumatoid arthritis.

c. Rheumatoid Arthritis

Vitamin C-rich foods, such as papaya, provide humans with protection against inflammatory polyarthritis, a form of rheumatoid arthritis involving two or more joints.

d. Promote Lung Health

If you are smoker, or if you are frequently exposed to second hand smoke. Eating vitamin A rich foods, such as papaya, help your lung healthy and save your life.

e. Anti-Sickling Activity

Current research proves that papaya is having an anti-sickling activity

f. Prevent Prostate Cancer

Men consuming lycopene-rich fruits and vegetables such as papaya, tomatoes, apricots, pink grapefruit, watermelon, and guava were 82% less likely to have prostate cancer compared to those consuming the least lycopene-rich foods.

G. Anticoagulant Effect

Injection of papian extract in a dog increases prothrombin and coagulation threefold. It is also claimed that the enzyme eliminates necrotic tissues in chronic wounds, burns and ulcers. Papain is also of commercial importance in the brewery industry, in the food industry and in the textile industry.

6. Allergies and Side Effects

Papaya is frequently used as a hair conditioner, but should be used in small amounts. Papaya releases a latex fluid when not quite ripe, which can cause irritation and provoke allergic reaction in some people.

The latex concentration of unripe papayas is speculated to cause uterine contractions, which may lead to a miscarriage. Papaya seed extracts in large doses have a contraceptive effect on rats and monkeys, but in small doses have no effect on the unborn animals.

Excessive consumption of papaya can cause carotenemia, the yellowing of soles and palms, which is otherwise harmless. However, a very large dose would need to be consumed; papaya contains about 6% of the level of beta carotene found in carrots (the most common cause of carotenemia)

a. Toxicity

Externally the papaya latex is an irritant to the skin and internally it causes severe gastritis. Some people are allergic to various parts of the fruit and even the enzyme papain has its negative properties.

b. Skin Discoloration

Eating too much of a yellow, green or orange-colored food that contains beta carotene can cause a benign form of skin discoloration called carotenemia. The palms of the hands and soles of

the feet are the most visible areas of the body affected by carotenemia. Cutting back on your papaya consumption will resolve the discoloration of the skin.

c. Free Radical Scavenging Activity

Papaya has many phenolic groups which may scavenge free radicals. Aqueous extract of papaya leaves shows anti-oxidant activity

d. Respiratory Distress

Papain is also a potential allergen, according to Purdue University, people who eat too much papaya and ingest high levels of papain may develop symptoms consistent with hay fever or asthma, including wheezing, breathing difficulties and nasal congestion.

e. Gastrointestinal Symptoms

Ironically, the same papain that calms your stomach can cause an upset stomach when taken in large amounts. The high fiber content of papaya can also contribute to unrest of the digestive system. The latex of the fruit's skin can also cause irritation of the stomach.

7. Preliminary Research

Papaya seed extract may have in toxicity-induced kidney failure. Evidently a kidney-transplant patient in London was cured of a post-operative infection by placing strips of papaya on the wound for 48 hours. Women in India, Bangladesh, Pakistan, Sri Lanka, and other countries have long used green papaya as an herbal medicine for contraception and abortion. Enslaved women in the West Indies were noted for consuming papaya to prevent pregnancies and thus preventing their children from being born into slavery.

Is Papaya in Pregnancy Safe or Not?

There are so many old wives tales and information flooding the media that people should or should not have certain foods to eat during pregnancy. But there is one specific food

which I get asked about so regularly that I need to write about it. That's Papaya, is it Safe?

There have been many research projects into the effects of foods on pregnant women and papaya is no exception. Now the problem with Papaya is that in an unripe state the Papaya contains high concentrations of Latex, this latex concentration reduces upon ripening and once completely ripe has almost no latex left.

The Papaya latex's main constituents are papain and chymopapain which have teratogenic (abnormalities of physiological development) and abortifacient (Can induce an abortion) effects. It does this by increasing the chances of uterine contractions as the papain acts like prostaglandin and oxytocin which are known to put a mother's body into labour and hence an adverse effect on the babies and mothers health.

The Latex can also cause marked oedema and haemorrhagic placentas which are bleeding and hemorrhaging from the edge of the placenta, this can result in severe complications in pregnancy and normally an early delivery.

Table 3: Home remedies practices

Preparation	Uses
PEEL	
Application of peel with a little milk and honey	protects soothe and moisturize the skin
Apply peel as the face mask for about 20 minutes	quite effective in ridding the skin of blemishes
Slice papaya into small pieces; soak in vinegar for several weeks. Remove the peel and	fight dandruff

papaya vinegar with lemon juice can be applied to the scalp for 20 minutes prior to shampooing to fight dandruff.		fruit	
peel simmered in olive oil, almond oil and rosehip oil, and the resulting papaya oil massaged into the skin and use with honey and rose water	Works as a skin toner and skin cleanser	LEAVES	
Adding papaya oil and vinegar to bath water, with oils like lavender, orange and rosemary	nourishing, refreshing and relaxing, and can work as a pain reliever and muscle relaxant	Wash the leaf and cut into smaller pieces Squeeze the pulp and filter with the cloth Two tablespoons serving per day It has a very bitter taste. Hence it may provide some relief to dengue fever.	Can cure dengue fever.
FRUITS		ROOTS	
Eat Fresh Ripe papaya in the morning	Indigestion, constipation, flatulence, improve appetite	A decoction formed by boiling the outer part of the roots	Cure of dyspepsia.
Apply unripe papaya juice on affected area.	pimples, eczema, mouth ulcer	SEEDS	
Eat at least 200gm of ripe fruit	Eliminate acid reflux.	Dried seeds pounded and mixed with vinegar.	skin irritant to lower fever
Fruit	It is used to treat mouth ulcer, gum disease and toothache.	Fresh or dry crushed seeds	bacteriostatic, bactericidal and fungicidal.
Unripe fruit	Contraceptive in some Asian countries	Take half	Expel intestinal worms
Soup made from fish and nearly ripen	In Southern China, lactating mothers drink the soup to improve milk flow		

teaspoon ground papaya seed with warm water in the morning before breakfast. follow 2 hours later with 50ml castor oil and 350ml milk on an empty stomach, take this for 2-4 days	
Seeds	Detoxify the liver

8. Cosmetic Benefits of Papaya

Rubbing the white pulp of raw papaya improves pimples as well as wrinkles. Papaya works as a good bleaching agent. It is an important ingredient in bath soaps, astringents, detergent bars and hand washes. Home Recipe for Papaya Skin Lightner Experts suggest that papaya can help in removing dead worn-out skin cells and replace it with healthy new cells, thereby lightening the color of our skin. For this, one can prepare a paste of raw papaya and apply it on the skin once for few days.

9. Conclusion:

Carica papaya is a nutraceutical plant having a wide range of pharmacological activates. The whole plant has its own medicinal value. The wide range of enzymes, vitamins present in Carica papaya makes it a nutraceutical plant. The present review is about all the prominent pharmacological activity, home remedies and side effects of Carica papaya.

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