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Review Article

A Review On: Carica Papaya

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ABSTRACT

Fruits and vegetables are an important part of a healthy diet. In this regard, Carica papaya (Papaya) is one of 4,444 species native to Mexico and northern South America, and now naturalized in many regions of the world, including 4,444 tropical and subtropical regions. Papaya pulp is rich in minerals and many vitamins, and the seeds contain glucosinolates, tocopherols, carotenoids, and benzyl isothiocyanates. Due to the presence of phenols, flavonoids, and alkaloids as the main phytochemicals, papaya is known for its numerous activities, including. More specifically, papaya fruit is used in the production of numerous processed foods, including jams, jellies, pickles, candied fruits, purees, concentrates, and canned slices/pieces. Fruit peels are used in cosmetics, wastewater treatment, animal feed, and as a binder in ceramics. Papaya leaves, bark, roots, and seeds have also been shown to have insecticidal and repellent properties. This review mainly focuses on the different phytochemicals found in different parts of Plant C. Papaya and its pharmacological properties and various other uses. To prepare this review, a literature search was conducted using classic herbal and fruit books. Online scientific databases (e.g. PubMed, Scopus, Sci Finder, Science Direct, Web of Science, Wiley Online, Google Scholar, ResearchGate, and other search engines) were searched up to October 2020 for valid reports; We found studies and surveys. All literature on the proposed topic was analyzed and summarized in this review article.

INTRODUCTION

Papaya is highly nutritious and available all year round. It is rich in vitamin C, vitamin A, and vitamin E, three powerful antioxidants. The 4,444 minerals include magnesium, potassium, vitamins B, pantothenic acid, folic acid, and fiber. Additionally, it contains digestive enzyme papain, which effectively treats the causes of trauma, allergies, and sports injuries. All the nutrients found in whole papaya improve the cardiovascular system, protect from heart disease, heart attack, stroke, and prevent colon cancer [1]. This fruit is an excellent source of beta-carotene, which protects against free radical damage that can cause certain types of cancer. It was reported that people helped prevent diabetic heart disease. Papaya is a

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good source of fiber, which lowers high cholesterol levels [2].

In 2004, more than 6.8 million tons of fruit were produced on approximately 389,990 hectares worldwide (FAO 2004). Of these, 47D44 were manufactured in Latin America (mainly Brazil), 30% in Asia and 20% in Africa. Brazil's papaya industry is one of the largest in the world and continues to grow rapidly. Do Carmo and Sousa Jr. (2003) found that total cultivated area has increased by 151% over the past decade (from 16,012 hectares in 1990 to 40,202 hectares in 2000), and production has increased by 164 to 44% over the same period. I reported it. 642, 581 to 1,693,779 fruits from 1990 to 2000). In 11 years, exports increased by 560% from 4,071 tons to 22,804 tons in 2001 and 38,760 tons in 2005 (FAO 2005). It is rapidly becoming an internationally important fruit, both as a fresh fruit and as a processed product [3]. Papaya fruit and leaf extracts have been reported to treat dengue fever and increase platelet counts [4]. Healing properties reported for various parts of C. papaya include antihypertensive, antibacterial, diuretic, anti-reproductive, antifungal and antitumor activities. Separate reports (phytochemistry/phytochemistry, pharmacological activities, production of nanoparticles from different plant parts, waste utilization, and various other applications of C. papaya) have been collected and presented in this communication. Therefore, in summary, here we review results highlighting isolated phytochemical compounds present in C. Papaya plant, its medicinal properties and various uses [5]. The papaya plant (Carica papaya) produces a specific proteolytic enzyme called papain. This plant-derived exogenous enzyme has many health benefits, especially as a protein solubilizer [6].

Papaya (Carica papaya) belongs to the family **caricaceae** is cultivated in Australia, Hawaii, the Philippines, Sri Lanka, South Africa, India, Bangladesh, Malaysia, and many other countries in tropical America. Other names associated with papaya include Tepaya from Kadazan Dusun City in East Malaysia, Betik from Peninsular Malaysia, Lechosa from Venezuela, Sri Lankan papaya, and Papali from India. The papaya plant C. produces milk because it contains specialized cells known as milk producers. Papaya emulsion is known to be a rich source of four cysteine endopeptidases, namely papain, chymopapain, glycyl endopeptidase and caricain, and its content is higher than that in fruit, leaves., contained in the roots. Commercially, papaya latex is harvested from fully grown but unripe fruit. Ripe papayas have lower latex content compared to green papayas, possibly because the function or destruction of latex-producing cells declines with age [7]. Papaya emulsion is known to be a rich source of four cysteine endopeptidases, namely papain, chymopapain, glycyl endopeptidase and caricain, and its content is higher than that in fruit, leaves, contained in the roots. All around the world for its edible fruits and for the enzymes stored in its laticifers [8].

C. Papaya leaves contain many active components such as papain, chymopapain, cystatin, tocopherol, ascorbic acid, flavonoids, and cyanide glucosides, which can increase the total antioxidant capacity and reduce lipid peroxidation levels in the blood. It has been proven that it contains and glucosinolates [9]. His current study represents the first collaborative attempt to assess the relative efficiency of water extraction techniques when applied to the bioactive components of papaya leaves. Plant phenolic compounds and their secondary metabolites, flavonoids and proanthocyanidins, have been widely reported as active bioactive components associated with antioxidant properties and health benefits [10].

(In fig.1) carica papaya

4] Varieties of Carica papaya in India:

Sr. No.	Name of varieties
1.	Co-1 to Co-8
2.	Pusa Majesty
3.	Pusa Delicious
4.	Pusa Nanha
5.	Pusa Dwarf
6.	Pusa Dwarf
7.	Surya
8.	Arka Prabhat
9.	Coorge Honey Dew
10.	Washington
11.	Solo varieties
12.	Ranchi
13.	RCTP-1and Red Lady

(Table no.1) Are some varieties of papaya present in India.[11]

Co-5 is the production of Papain, which has high proteolytic activity & high protein produce. This all varieties are the sweet and good shelf life [12].

In India, a large number of C. papaya varieties are cultivated. Important varieties that are grown in different state are given here under:

1] Andhra Pradesh: Taiwanese lines and Surya

2] Bihar: Pusa Dwarf, Pusa Majesty, Pusa Nanha, Pusa Giant, Pusa Delicious and Ranchi.

3] Karnataka: Coorg Honey Dew, Sunrise Solo, CO-3, CO-4, Surya and Taiwanese lines**.**

4] Maharashtra: Taiwanese lines.

5] Orissa: CO-3, Coorg Honey Dew, Surya, Washington, Ranchi, Pusa Dwarf and Pusa Delicious.

6] Tamil Nadu: CO-3, CO-4, CO-5, CO-6, CO-7 and Coorg Honey Dew. Coorg Honey Dew, Pusa Dwarf, Pusa Delicious, CO-1.

7] Uttar Pradesh: Coorg Honey Dew, Pusa Dwarf, Pusa Delicious, CO-1, CO-5 and Barwani Red [13].

5] Geographical distribution:

C. papaya is a native plant grown in almost every region of the world, including India, Sri Lanka, Tanzania, Florida, the Philippines, South Africa, and Australia. Among these 4,444 countries, India has the highest variety of papaya varieties. They live in warm regions with sufficient rainfall and temperatures ranging from 21 to 330 degrees Celsius [14]. In India, the states involved in cultivation of C. papaya plant are Maharashtra, Bihar, West Bengal, Haryana, Punjab, Delhi, Uttar Pradesh and Andhra Pradesh [15].

(Table 2) Indian synonyms of carica papaya [14]

Language	Region	Name
Hindi	Haryana, Delhi	Papaya, Papita
Bengali	West Bengal	Papaya, Papita, Pepe
Tamil	Tamil Nadu	Pappali
Malayalam	Kerala	Omakari
Punjabi	Punjab	Papita,
Marathi	Maharashtra	Papai
Gujarati	Gujarat	Papaya
Rajasthani	Rajasthan	Eerankari
Oriya	Orrisa	Amrut bhanda
Kannada	Karnataka	Pharangi
Telugu	Andhra Pradesh	Boppayi Pandu

According to statistics from the Food and Agriculture Organization of the United Nations (FAO), 4,444 fruit species and approximately 6.8 million tons are produced annually around the world, with Central and South America, especially Brazil, accounting for 47% of the fruit yield. In the global production of 4,444 tropical fruits (2012), papaya production ranked third (15.4%) after mango (52.9%) and pineapple (26.6%). This plant

has various names such as kepaya, papaya, tapaya, and basic on location [16]. The exotic papaya comes from the United States, Mexico, and Costa Rica. Meanwhile, the native territories include Colombia, Australia, Bahamas, Malaysia, Brazil, Kenya, Indonesia, India. Singapore, Philippines, Peru, Puerto Rico, Antigua and Barbuda, New Zealand, Cuba, Sri Lanka, Solomon Islands, Uganda, Nigeria, Myanmar, South Africa, Thailand, Trinidad and Tobago, Saint Kitts and Nevis, Saint Vincent and the Grenadines, Tanzania, Venezuela, Vietnam, Virgin [5].

In 2010, the world production of tropical fruits (excluding bananas) reached 73.02 million tons (Mt), and papaya ranked third with 11.22 million tons, 15.36% of the total annual production of tropical fruits. I did, World papaya production is highly concentrated, with the top 10 countries accounting for an average of 82.32% of his total production in 2008-2010. India is the major papaya producing country accounting for 38.61% of the world's production (2008-2010), followed by Brazil (17.5%), Indonesia (6.89%), Nigeria (6.79%) and Mexico (6.18%)., Ethiopia (2.34%), Congo (2.12%), Colombia (2.08%), Thailand (1.95%), Guatemala (1.85%). The economic value of papaya is not only in providing food to people, but also as a source of income. In the past years, commercial cultivation has begun in Malaysia, Thailand, the Philippines, Indonesia, and India, and new high-yielding varieties have been introduced. The top papaya exporting countries in the world are Mexico, Brazil, Malaysia, India, and the United States (mainly by re-export). The main papaya varieties that dominate world trade are Solo, Sunrise, Maridor (red and golden), Red Lady, Linda, and Tainun [17].

6] Chemical constituents:

Different parts of papaya such as fruit, juice, seeds, roots, leaves, bark, and latex contain different chemical components expressed as follows:

1. Fruit- Protein, Fat, Fiber, Carbohydrates, Minerals, Calcium, Iron, Vitamin C, Thiamine, Riboflavin, Niacin, Carotene, Anic Acid, Citric Acid, Malic Acid (Green Fruit), Volatile Compounds: Benzyl isothiocyanate, cis, trans-2,6-dimethyl-3,6-epoxide-7 octen-2-ol, alkaloid, calpain.

2. Juice- N-butyric acid, n-hexanoic acid, n-octanoic acid, lipids. Myristic acid, palmitic acid, stearic acid, linolenic acid, linoleic acid, oleic acid.

3. Seed- fatty acids, crude protein, crude fiber, papaya oil, calpain, caricin, glucotropacholine, enzyme myrosin.

4. Root- carposide and the enzyme myrosin.

5.Leaf- alkaloids calpain, pseudocalpain, dehydrocalpain I and II, choline, vitamins C and E, carposide.

6. Bark- glucose, fructose, sucrose, xylitol, beta-sitosterol.

7. Latex- papain, chemopapain, peptidases A and B, lysozyme.

Nutritional value of 100 g of papaya fruit Ripe papaya contains energy (163 kJ), protein (0.6 g), fat (0.1 g), minerals (0.5 g), and fiber (0.8 g). included., Carbohydrate (7.2 g), Beta Carotene (888 μm), Total Carotene (2 740 μm), Sodium (3 mg), Iron (0.10 g), Vitamin A (1 094 IU), Vitamin E (0.73 mg), niacin (3 mg) and water (89%). These nutritional values of C. papaya help to prevent the oxidation of cholesterol. C. papaya is rich in iron and calcium; a good source of vitamin A, B and G and an excellent source of vitamin C (ascorbic acid). The extract and fruit juice of C. papaya contain alkaloids, glycosides, flavonoids, carbohydrates, saponins, terpenoids, steroids and tannins [1].

A] Biochemistry of C. papaya leaf:

Vitamins: Ascorbic acid, Niacin, Riboflavin, Thiamine, alpha tocopherol.

Minerals: Calcium, Potassium, Phosphorus, Magnesium, Zinc, Manganese and Iron.

Aminoacids: Trytophan, Mrthionine, Lysine.

Enzymes: Papain, Chymopapain, Carican, and Glycylendopeptidase.

Alkaloids: Carpaine, Pseudocarpaine, Carpine, Dehydrocarpaine I & II, Nicotine, Choline, Bispiperidine.

Flavonoids: Kaemferol, Myricetin, Quercetin.

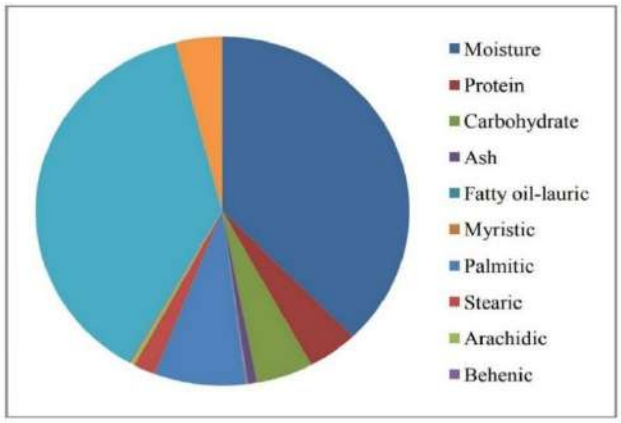
Phenolic compounds: Caffeic acid, P-coumaric acid, Chlorogenic acid.

Glycoside: Carposide.

Carotenoids: Beta-carotene, Lycopene, Lutein, *Cryptoxanthin*, Violaxanthin, Zeaxanthin.

Other Compounds: Cystatin, Saponins, Tannins, Anthraquinone, and steroids.

B] Biochemistry of C. papaya seed: C. papaya seeds own major bioactive compounds that are answerable for the anthelminthic interest and Phospholipids phosphatidylcholine, cardiolipin [14].



(In fig.2) Nutritional Composition of c. papaya seeds [14].

7] Morphological features of papaya:

Although papaya is an herb in nature, its structure does not resemble herb, but rather resembles a tree. C. papaya is commonly called Papaya. The leaves are very large and palm-shaped in shape. The average leaf size is 50-70 cm in diameter. Papaya flowers are generally dioecious. The shape of the fruit that grows depends on the type of flower. The male flowers are straw colored. The corolla tube is cylindrical and approximately 2 cm long. Female flowers are racemes. The length of the fruit is 5-30 cm, the color is yellow-orange. The fruit contains some black seeds and the pulp is sweet [5].

Varieties: Papaya plant has been identified with variety and considerable size and with quality and characteristics. The few prominent and cultivated are Solo, Kapoho Solo, Dwarf Solo, Waimanalo, Heggins, Honey Gold, Cariflora, Sunrise Solo.

The plant contains latex in all parts due to the presence of specialized cells called laticifers which is responsible for the secretion of latex considerably has medicinal properties.

Soil: The best soil required for the growth of C. papaya is porous soil, which is rich with organic matter, the plant is said to grow with limestone, marl, or various other soils with adequate care. The optimum pH required is about 5.5 to 6.7.

Climate: Papaya grows in tropical and subtropical areas; it requires adequate temperature and plentiful rainfall or irrigation. It is very sensitive to frost and limited to the region between 320 north and 320 souths of the Equator [14].

8] Pharmacological Activity of C. papaya:

C. Papaya plant has antioxidant, antihypertensive, wound healing, hepatoprotective, anti-inflammatory, antibacterial, antifungal, anti-reproductive, histamine, diuretic, antiamoebic, and antitumor effects. It has been proven that it has various medicinal properties such as, anthelmintic and smooth muscle effects. Antimalarial, hypoglycemic activity, immunomodulatory activity, antiulcer activity, anti-sickle cell activity.

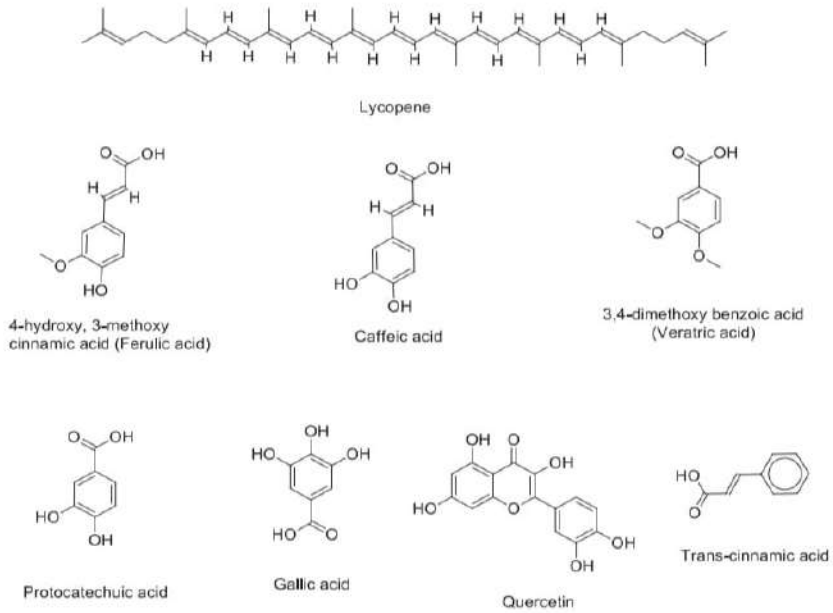
A] Antioxidant activity:

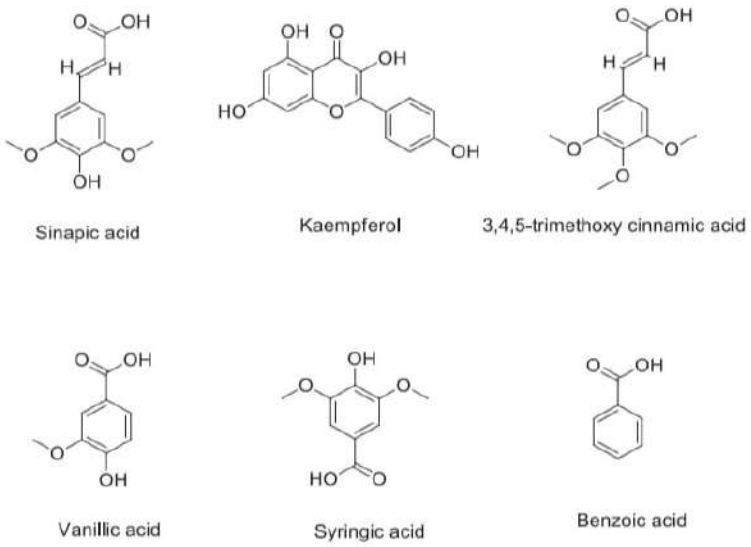
A methanol extract of unripe fruits of C. papaya was studied in vivo for its effects on the activities of several antioxidant enzymes, including glutathione peroxidase. (GPx), glutathione transferase (GST), glutathione reductase, catalase, and glucose-6-phosphate dehydrogenase in mice treated with 100 mg/kg orally. Ethyl acetate fraction significantly increases glutathione reductase, GST, GPx, and glucose-6-phosphate dehydrogenase activities. After administration of

the ethyl acetate fraction, a significant decrease in GPx was observed in the kidney. It has been suggested that quercetin and β-sitosterol may be involved in antioxidant capacity [1]. According to research, the hexane fraction of male flowers of C. papaya exhibits good antioxidant activity (IC50 = 100.81 ± 1.180). The low IC50 value reflects the high antioxidant activity of the fraction. The antioxidant capacity of fruit extracts at the ripening stage was determined by different methods (iron-reducing antioxidant activity, 2,2-diphenyl-1- picrylhydrazyl (DPPH) and 2,2-azinobis-3-ethylbenzo thiazoline-6-sul). results showed that the antioxidant activity of papaya fruit increased during the ripening stage [5]. Flavonoids are phenolic compounds naturally occurring in papaya that are effective free radical scavengers. The high potential of phenol to scavenge free radicals can be attributed to its large number of phenolic hydroxyl groups. Aqueous extract of Carica papaya leaves showed antioxidant activity [15].

B] Antihypertensive activity:

For antihypertensive activity, ethanol extract of ripe papaya fruit was used. Basal mean arterial blood pressure (MAP) was (93.8 ± 4.5), (175.2 ± 5.1), (181.3 ± 6.2) mmHg for normotensive, renal and DOCA salt therapy. Both hydralazine (200 µL/100 g, i.v.) and the ethanolic extract (20 mg/kg, i.v.) from unripe fruits of C. papaya were administered to normotensive, renal and DOCA salt-hypertensive animal populations. significantly decreased MAP. However, in the hypertensive group, this extract caused about 28% more MAP inhibition than hydralazine. study suggested that unripe fruits of C. papaya have a strong antihypertensive effect [1]. Papaya leaf decoction can be used as an antihypertensive agent. A study involving villagers in Agbovir District, 80 km from Abidjan (West Africa), demonstrated the antihypertensive effects of the papaya plant when was administered orally [15].





Identified bioactive phytochemicals in various parts of carica papaya plant (in fig. 3) [16]

C] Wound Healing Activity:

Aqueous extract of C. papaya fruit [100 mg for 10 days] on wound healing properties in streptozotocin-induced diabetic rats using excision and dead space wound models. The aqueous extract shows a 77% reduction in wound area compared to 59% wound contraction in the control [1]. Not only wounds but also various skin diseases can be cured with papaya. The wound healing effects of ethanolic papaya seed extract were tested in Sprague-Dawley rats [5]. Papaya is herbal medicine used in developing countries to treat burns, soft tissue wounds, and skin infections [15].

D] Hepatoprotective activity:

Aqueous and ethanolic extracts of dried fruits of C. papaya were used for hepatoprotective activity in rats against CCl4- -induced hepatotoxicity in rats. Aqueous (250 mg/kg, oral) extract and ethanolic (250 mg/kg, oral) extract of C. papaya can reduce biochemical parameters such as SGPT, SGOT, serum bilirubin, and alkaline phosphatase. showed significant hepatoprotective effects [1].

E] Anti-inflammatory effect:

Ethanol extract of C. papaya leaves with carrageenan induced paw edema and cotton pallet granuloma in rats. Formaldehyde- induced arthritis model. The ulcerogenic activity of the extract was also investigated. Results showed that the extract at oral doses of 25 to 250 mg/kg was effective when taken orally. demonstrated a significant reduction in paw edema in the carrageenan test. This extract caused mild mucosal irritation at high doses [1]. C. papaya contains a variety of secondary metabolites, including alkaloids, tannins, flavonoids, and saponins, which have been shown to be highly effective in reducing chronic inflammatory responses. Proteolytic enzymes present in C. papaya, such as papain and chymopapain, also showed anti-inflammatory effects as well as effects on immunomodulation [5].

F] Antibacterial activity:

Aqueous extract of C. Papaya leaves and roots showed antibacterial activity against some human pathogenic bacteria at 4,444 different concentrations (25, 50, 100, and 200 mg/mL) using the agar diffusion method [1]. It used green unripe papaya fruit extract for Ag NPs, and these NPs showed antibacterial activity against Escherichia coli and Pseudomonas aeruginosa [5]. Carica papaya seeds are bacteriostatic against several enteric pathogens, including Bacillus subtilis, Escherichia coli, Salmonella typhi, Staphylococcus. Pneumonia was found to have activity. Among the Gram-positive and Gram-

negative bacteria tested, Gram-negative bacteria were more sensitive to the extract. The fact that the extract showed activity against both Gram-negative and Gram- positive bacteria suggests that the activity of is broad-spectrum [15].

G] Antifungal Activity:

C. papaya latex and fluconazole have a synergistic effect in inhibiting the growth of Candida albicans. This synergistic effect causes partial cell wall degradation. latex protein is believed to be involved in antifungal activity, and the minimum protein concentration resulting in complete inhibition has been reported to be approximately 138 mg/mL [1].

H] Anti-fertility activity:

Crude extract of C. papaya bark [5-10 ml/kg, days), oral administration] for 4 weeks] In the seminiferous tubules of rats, decreased motility and morphological changes of spermatozoa of were observed. Complete loss of fertility due to changes was shown. Therefore, bark was found to be safe and may function as an effective male contraceptive in animals [1].

I] Histaminergic activity:

C. Papaya (0.5–512 µg/ml) caused concentration-dependent contractions of ileal strips suspended in Tyrode's solution. This was mediated through the H1- receptor and depended on extracellular Ca 2+ influx [1].

J] Diuretic activity:

Papaya root has diuretic properties [15]. Oral administration of C. papaya root water extract to rats at a dose of 10 mg/kg significantly increased urinary excretion and showed a similar urinary electrolyte excretion profile as hydrochlorothiazide [1].

K] Anti-amoebic activity:

Part Medicinal Uses Ripe Fruit Carminative, diuretic, chronic diarrhea, urinary tract ulcers, stomach diseases, expectorant, antibacterial, laxative, used to remove venom in snake bites, promotes miscarriage. Seed Carminative, inhibits male fertility and relieves inflammation. Leaf Asthma, beriberi, fever, abortion, wound healing (fresh leaves), antibacterial action, jaundice, gonorrhea, urinary tract disease, insect damage. Flower Antipyretic, jaundice, and breast benefits [1]. Papaya seeds showed anti-amoebic activity in vitro [15].

L] Antitumor Activity:

C. Papaya leaf aqueous extract (0.625-20 mg/ ml) exhibits antitumor activity. Extract is derived from solid tumor cells derived from cervical carcinoma (Hela), breast carcinoma adenocarcinoma (MCF-7), hepatocellular carcinoma (HepG2), lung adenocarcinoma (PCI4) and pancreatic epithelial carcinoma (Panc). It significantly inhibited the growth response of strain -1) and mesothelioma (H2452) in a dose-dependent manner [1]. Carica papaya leaf water extract had antitumor effects on the proliferative response of solid tumor cell lines and hematopoietic tumor cell lines. Carica papaya extract dose-dependently inhibits the proliferation response of solid tumor cell line derived from cervical cancer, breast adenocarcinoma, hepatocellular carcinoma, lung adenocarcinoma, pancreatic epithelial carcinoma, and mesothelioma [15].

M] Anthelmintics:

Dried papaya seeds administered as an elixir with honey showed significant efficacy against intestinal parasites in humans with no significant side effects. Benzyl isothiocyanate present in the seeds is the main anthelmintic agent [1]. Aqueous extract from papaya seeds showed anthelmintic properties against Ascaris lumbricoides and ascaridia galli [15].

N] Effects on smooth muscle:

Ethanol extract from papaya seeds at concentrations of 0.1 to 6.4 mg/ml showed a concentration-dependent inhibition of jejunal contractions and was found to be significantly irreversible. Therefore, extract can weaken the contractility of isolated His rabbit jejunum [1].

O] Antimalarial Activity:

Petroleum ether extract from the skin of raw papaya fruit (concentrations 0.05-1,000 µg/ml). Extract showed significant antimalarial activity [1]. Additionally, methanol, chloroform, and petroleum ether extracts from fruit peels and papaya roots were tested for antiprotozoal activity against Plasmodium berghei in mice. The results showed that petroleum ether and C. his chloroform extracts of papaya fruit peel showed significant antiprotozoal activity in a dose-dependent manner, but petroleum ether extract showed the highest antimalarial activity [5].

P] Hypoglycemic effect:

The ethanolic leaf extract of C. papaya produced a significant decrease in blood glucose level at a dose of 5.0 mg/ kg, but there was no significant effect at a dose as high as 10 mg/kg. Extract delayed the onset of hypoglycemic effects of glimepiride and enhanced the hypoglycemic effects of metformin, with variable interactions differing for each combination of drug and extract [1]. In this study, oral treatment with 0.1 mg/kg/day glibenclamide and Carica papaya seed aqueous extract 100-400 mg/kg/day resulted in significant, stable and progressive hypolipidemia. It has been shown to cause glycemic and hypolipidemic effects [15].

Q] Immunomodulatory activity:

The chemical components of C. papaya seed extract and its bioactive fraction were tested in-vitro using lymphocyte proliferation assay and complement-mediated hemolysis assay. Fermented papaya preparation is a macrophage-activating factor that increases nitric oxide synthesis and tumor necrosis factor alpha [1].

R] Anti-ulcer activity:

Effect of aqueous seed extract of C. papaya at oral doses of 50 mg/ kg and 100 mg/kg on alcohol-induced acute gastric injury and blood oxidative stress in rats. The gastric acid content of was significantly reduced in rats treated with 100 mg/ kg of extract [1].

S] Anti-sickling activity:

Methanol extract of C. Papaya at a dose of 10 mg/ ml reduced hemolysis in vitro and protected red blood cell membrane integrity under osmotic stress conditions [1]. Sickle cell disease (SCD) is caused by a mutation in hemoglobin in red blood cells, in which valine replaces glutamate at position 6. A recent study showed that unripe papaya fruit extract has anti-sickle cell formation activity [15].

T] Dose-dependent antioxidant activity:

The aqueous extracts of C. papaya seeds on oxidative hydrogen peroxide (H2O2) stress in human skin Detroit 550 fibroblasts. The purpose is to evaluate antioxidant activity. C Papaya seed aqueous extract is non-toxic and acts as an effective radical scavenger to protect Detroit 550 fibroblast cells exposed to H2O2 oxidative stress. The data show that (i) extract does not increase catalase activity in the presence of oxidative stress, preventing release of cytochrome c and loss of internal mitochondrial transmembrane potential. (ii) The extract is more effective than vitamin C in preventing oxidative damage. (iii) The purified sub-fraction of the semen extract exhibits the same antioxidant activity as the whole extract [1].

U] Insecticidal and repellent response:

C. Papaya seed extract (petroleum ether, benzene, ethyl acetate, chloroform: methanol and crude extract are larvicidal, acaricidal, adulticidal and repellent may be useful due to its effects) smoke toxicity against stephensi, Culex, malaria, and Anopheles mosquitoes [5].

V] Antidiarrheal responses:

The chloroform extract (25 mg/ mL) of raw C. papaya and acetone extract (25–0.39 mg/mL) of ripe C. papaya had essential antidiarrheal activity against the gut pathogens. The antidiarrheal activity of mature C. papaya extract was observed over a wide range against Plesiomonas

shigelloides, ranging from 50 mg/ml to and 0.39 mg/ml. And reported that DAS-77 (herbal mixture of dried root of C. papaya and young bark of Mangifera indica) was effective in treating diarrhea [5].

W] Anticancer activity:

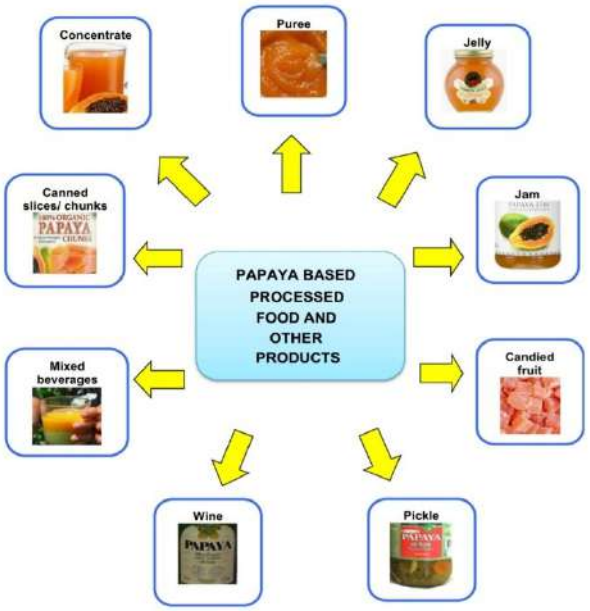
In vitro studies of C. papaya revealed that papaya has anti-cancer properties. This plant contains an enzyme called papain, which is a component of papaya and is very useful in treating cancer. Fibrin is broken down by papain, which coats tumor cells with amino acids. The pigment lycopene is found in papain and is highly reactive to free radicals and oxygen. Papaya also contains isothiocyanate, which protects against breast, prostate, pancreatic, lung, leukemia, and colon cancers [5]. It was investigated whether the active component of C. papaya, identified as papain, had an effective anticancer effect. The enzyme papain contains lycopene, which reacts with free radicals and oxygen to inhibit cancer by breaking down fibrin within tumor cells [16].

X] Anti-dengue activity:

C. Papaya leaf juice prepared using traditional methods. and 2 tablespoons of juice to her five dengue patients three times a day after 6 hours. Leaf juice has been shown to cause a significant increase in platelet counts within 24 hours of treatment. An increased platelet count was observed in a -year-old patient. Taking tablets containing papaya leaf extract three times a day for five days suggested that this effect may be due to the expression of gene, which is involved in platelet formation and is called platelet activating factor receptor g. it was done [5]. S. Oral or intraperitoneal administration of different preparations of C. papaya at different stages of pregnancy had the following effects on pregnancy and fetal development: B. Increased anti-implantation activity, post-implantation loss and embryotoxicity [10].

9] Other Application:

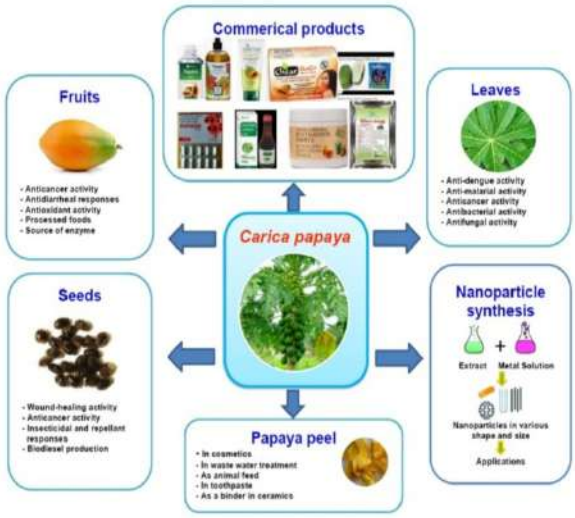
A] Use of papaya based processed other product:



In fig. 4 Papaya Based Processed food and beverages [5]

It has already been reported that papaya fruit grows very quickly and has a high production rate as it is grown all year round. Therefore, the main question is how to use the product as a whole. Otherwise, the product will be damaged. Papaya fruit is usually not widely used around the world. Therefore, it can be used in the development of processed foods and other related products to enhance the self-growing ability of papaya fruit. Many studies have been reported in this field, including the use of papaya to make jam with other substances Jelly, pickle, candied fruit, puree, wine, mixed beverages, canned slices/ chunks, conc. Spray-dried enzyme, ice cream Overall Product Papaya Production Rating [5].

B] Use of papaya waste:



In fig. 5 various application of papaya and their products.

Huge quantities of papaya are produced every year and used for 4,444 different purposes. Therefore, a large amount of waste and by-products was generated. The waste percentage of papaya peel is reported to be approximately 12% and papaya seeds 8.5% of the fruit weight. Papaya peel contains vitamins such as vitamin A, vitamin C, riboflavin, thiamin, and niacin. It is a source of phenols, alkaloids, flavonoids, tannins and saponins (18). Also contains various valuable minerals such as calcium, sodium, potassium, phosphorus, and magnesium [19]. The recently have reported the use of papaya stem as a source of heterogeneous catalyst for biodiesel production. Overall, the waste materials obtained from papaya have been used for the production of a number of products. However, most of the data is based on laboratory research, thus a pilot plant trial is required. Further, the physicochemical properties of papaya peel vary with the geographical location, varieties, and season so on, and may affect the processing, and other associated activities. Thus, an extensive research investigation is required [20].

C] Commercial products from papaya:

The world of cosmetics is an important industry today. Cosmetics are used all over the world to improve the overall appearance of the human body. There are different types of cosmetics available in the market that can be used on different parts of the body. Currently, there is a growing demand for herbal cosmetics to avoid damage caused by chemical cosmetics. The bioactive ingredients of botanical are used in a variety of herbal cosmetics such as face creams, face packs, lotions, and hair products such as oils and conditioners. It is preferred because it has no side effects and is safe to use. Herbal cosmetics are cosmetics that use organic ingredients that have no side effects on the skin or hair [21]. Papaya additionally has a incredible impact on pores and skin and hair in keeping with many investigations. The reported that 4,444 unripe fruits of papaya can be used as an ingredient in facial products such as facial creams. Papaya pulp is used to remove impurities from the skin and soften it [22]. Another study found that papaya can be used as an ingredient in anti-acne face packs due to its bleaching and antioxidant properties [23].

There are several papaya-based skin care products on the market today. Additionally, papaya is an antioxidant, making it suitable for soap formulations. Bar soap was prepared using papaya-derived crude enzyme papain. Bar soap removes stains more effectively than enzyme-free soap. After investigating the antioxidant activity of different soap formulations, the best formulation was formulation IV (addition of 30% papaya fruit and 1.5% crude papain enzyme as antioxidants). The fatty acid value of was 79%. pH value 10.35. Specific gravity 1.0595 g/ ml. Alkali-free 0.108% and foaming 78% corresponds to 5 minutes [24].

CONCLUSION

C. Papaya is an herbaceous, tree-like plant that grows in various regions of the world. Different parts of the plant are rich in enzymes, minerals, vitamins, alkaloids, phenols, and flavonoids, which are involved in traditional and modern uses. Due to its proven pharmacological effects (anti-

inflammatory, antioxidant, antibacterial, immunomodulatory effects, etc.), papaya is suitable for the treatment of various diseases and is used in several over-the-counter medicines, such as the treatment of dengue fever. is also available. Currently, papaya fruit is used to make a variety of processed products, including jams, jellies, pickles, candied fruits, purees, concentrates, and preserved slices/pieces. Various parts of plants have also been used for the synthesis of nanoparticles, increasing the potential for current and future applications. Overall, studies have shown that papaya can play an important role in the healthcare sector, pharmaceutical sector, food processing sector, herbal cosmetics sector and contribute to the economic growth of various countries. Additionally, several pilot plant trials are required to fully utilize papaya waste. Moreover, more extensive research is needed to study the growth and development of papaya plants in different geographical locations/seasons/conditions for the production of important phytochemical compounds that can be effectively used in important formulations such as dengue fever. Further research is required.

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