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Review Article

A REVIEW ON MEDICAL ADVANTAGES AND CHEMICAL CONSTITUENTS OF *CARICA PAPAYA* LINN.

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ABSTRACT

Papaya is an evergreen blossoming plant having rich characteristic thing; it is recognized to offer different therapeutic purposes of premium. The normal item is sound and delicious. The entire plant parts such as root, bark, peel, seeds, blooms, leaves, and squash are known to have helpful properties. It is utilized for the treatment of a various infections such as dengue fever, warts, corns, sinuses, skin inflammation, against diabetic, glandular tumors, blood pressure, digestive disorders, constipation, antibacterial, antifertility, anti-HIV, expel worms, invigorate regenerative organs and many, as needs be it can be seen as a nutraceutical. The present review focuses on salient features of nutritional composition, health benefits, medical advantages, and synthetic constituents of papaya.

Keyword: Papaya, Dengue fever, Antifungal activity, Anti-HIV activity.

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INTRODUCTION

Papaya is developed broadly in all tropical and sub-tropical parts of the world. Papaya has been viewed as a standout among the most profitable tropical organic products that contain beta-carotene, protein, starch, vitamins, and minerals. The papaya is a little, scantily expanded plant, for the most part with a solitary stem developing from 5 to 10 m tall, leaves are extensive, 0.5 to 0.7m in width, significantly palmately lobed, with seven projections. Papaya common items have smooth skin, green, while young turning yellow. The normal Philippine papaya is typically pear shape around 0.1–0.4 m long on maturity [1]. Prepared papaya feels fragile, the skin has yellowish shading, and when opened it has a sensitive orange-yellowish tissue with different minimal dim seeds embedded at the vacant core interest (Fig. 1) [2].

MATERIALS AND METHODS

Medical advantages of papaya

Carica papaya leaves extracts for the treatment of dengue fever [3-13]

Ahmad *et al*. have revealed an examination that the capacity of *C. papaya* departs separate evacuates against dengue fever in Asian Pacific Journal of Tropical Biomedicine. The patient was given 25 ml of leaves extracts twice, day by day for 5 back to back days. It was noted in the report the platelets check, white blood cells and neutrophils lessened from 84.0% to 46.0%. In this way, the blood tests were rechecked after the association of leaves evacuate, watched that the platelets tally, white blood cells, and neutrophils extended from 46.0% to 78.3%.

Patil *et al*. decided the impact of *C. papaya* departs fluid concentrate in expanding the platelet check-in thrombocytopenic rodent display. Watery concentrate of *C. papaya* leaves at a grouping of 400 mg/kg and 800 mg/kg were given to cyclophosphamide prompted thrombocytopenic rats for a time of 15 days. Blood was pulled back at different time interims to decide the platelet check. Likewise, the coagulating time was resolved on the 15th day of the examination by slender strategy. *C. papaya* leaf separate was found to increase the platelet check and furthermore to diminish the coagulating time in rats. The investigation goes for deciding the conceivable impacts of papaya leaves in thrombocytopenia happening in dengue fever.

C. papaya health benefits for blood-related helpful issues [14-16]

Ikpeme *et al*. have reported an examination on the phytochemistry and hematological capacity of the ethanol seed, leaf and mash think of *C. papaya* in Pakistan Journal of Biological Sciences. In this examination, it was perceived that the phytochemical substance in the seeds, leaf, and mash of *C. papaya* was almost the same however in contrasting degrees. It was likewise watched that the phytochemicals found in *C. papaya* by and large improved the creation of certain blood parameters in treated albino rats.

Antihyperglycemic effects of ethanol extracts of C. papaya [17-20]

Sasidharan *et al*. have revealed an examination on the phytochemicals in *C. papaya* may have antihyperglycemic activity in Journal of Natural Product Research. The ethanolic concentrates of *C. papaya* and *Pandanus amaryfollius* were coordinated to a social occasion of streptozotocin impelled diabetic rats to measure it's against diabetic effects. The examination prescribes that the phytochemical found in *C. papaya* and *P. amaryfollius* might be in charge of the counter diabetic well-being benefits.

C. papaya health benefits for digestive disorder [21-25]

Muss *et al*. have reported a study on the on the digestive disorders of *C. papaya* in the journal of Biogenic Amines. Clinical trials including volunteers with constant acid refluxes and dysfunctions in the gastrointestinal tract were given papaya preparation. They were contrasted with a control aggregate given a fake treatment. The examination prescribes that gigantic change in the symptoms of acid reflux and swelling for those under the papaya arranging when stood out from the control gathering. The estimation of the constituents of papaya and its health benefits were discussed in Table .1 and Table.2 respectively.

Antifungal activity [26-30]

Chavez-Quintal *et al*. have revealed an examination on the antifungal activity of ethanolic extracts of *C. papaya* L. cv. Maradol leaves and seeds of discarded ripe and unripe fruit in Indian Journal of Microbiology. Seed extracts indicated inhibition of fungal activity against three phytopathogenic growths: Rhizopus sto lonifer, *Fusarium* spp. also,

Fig. 1: *Carica papaya* **tree, flower, and ripe fruit**

Table 1: Healthful estimation of 100 mg of papaya fruit [77]

Contents	Green papaya	Ripe papaya
Protein	600 mg	700 mg
Fat	100 mg	200 mg
Mineral	500 mg	500 mg
Carbohydrate	720 mg	570 mg
Fiber	800 mg	900 mg
Energy	32 Kcal	27 Kcal
Total carotene	2740 µm	0
Beta-carotene	888 µm	0

and Colletotrichum gloeosporioides. Singh and Ali have reported the antifungal movement of the methanolic concentrate of the seeds indicated antifungal action against *Aspergillus flavus*, *Candida albicans,* and *Penicillium citriniumin* Indian diary of pharmaceutical sciences.

Papaya and pregnancy: Safety and side effects [31]

Adebiyi *et al*. have reported an investigation done in the Department of Obstetrics and Gynecology in the British Journal of Nutrition. In a lab examine, the effects of prepared papaya blend (500 ml/l water) and papaya foul latex to the uteri of pregnant Sprague Dawley rats was diverged from a control aggregate given with water in a manner of speaking. Results have shown that ready papaya has no threatening or perceptible responses, while the rough latex incited convulsive narrowing of the uterine muscles. The examination prescribes that common usage of ready papaya and pregnancy may not represent any noteworthy threat speak to any gigantic hazard. The unripe or semi-ready papaya could be unsafe in pregnancy.

Antihelminthic and antiamoebic activity of C. papaya seeds [22,32-34]

Okeniyi *et al*. have uncovered the ampleness of dried *C. papaya* seeds against human intestinal parasitosis in the Journal of Medicinal Food. The patient was given either dried seeds of *C. papaya* blended with nectar or nectar alone. 76.7% of the individuals who were given nectar blended with dried seeds of papaya were cleared of parasites following 7 days while 16.7% of the individuals who took nectar alone. This examination reasons that air-dried *C. papaya* seeds are strong in treating human intestinal parasites and without critical side effects.

Anticancer and immunomodulatory activity of C. papaya [35-37]

Otsuki *et al*. have detailed that liquid plan of *C. papaya* leaf extricates have basic improvement inhibitory activity on tumor cell lines in the Journal of Ethnopharmacology. The examination additionally proposes that *C. papaya* leaf concentrate may conceivably give way to the treatment and anticipation of chose human illnesses, for example, growth, different unfavorably susceptible scatters, and may likewise fill in as immune adjuvant for antibody therapy.

Fauziya and Krishnamurthy papaya (2013) reported the anticancer activity of papaya in CIB Tech JPharm Sic. A papaya *in vitro* thinks about demonstrates that it will treat numerous disease cell line and papaya physiochemical having anticancer exercises. Papaya is rich in compound papain which is viable against growth. Papain separates the fibrin disease cell divider furthermore, protein into the amino corrosive frame. Other than papain, it, moreover, contains lycopene which exceedingly receptive toward oxygen and free radical. Isothiocyanate present in Papaya is powerful against lung, pancreas and prostate cancer. These chemicals fit of restraining both arrangement and improvement of disease cell.

Antibacterial and wound healing effect of C. papaya [38-41]

Dawkins *et al*. have distributed an article on the antibacterial development of *C. papaya* natural product remove against fundamental damage life shapes in the West Indian Medical Journal. They reported seed isolates from the organic product showed obstruction of bacterial development against *Bacillus cereus*, *Escherichia coli*, *Streptococcus faecalis*, *Staphylococcus aureus*, *Proteus vulgaris,* and *Shigella flexneri*. This examination prescribes that *C. papaya* has antibacterial effects that could be profitable in treating perpetual skin ulcers to advance healing. Islam *et al*. have reported antibacterial activity of the latex of papaya against *Bacillus subtilis*, *E. coli*, *Agrobacterium* sp., and *Rhizobium* sp. in Asian Journal of Pharmaceutical and Clinical Research.

Antifertility activity [42,43]

Poharkar *et al*. revealed that the counter fruitfulness impacts of *C. papaya* were analyzed by bolstering grown-up and pregnant rodent with various parts of the natural product in the journal herb med toxicology. No endeavor was made to forcibly feed the creature, and the outcome showed that the unripe fruit interfered with the estrous cycle and instigated fetus removal. This impact vanished as the organic product wound up stale or over riped. Chloroform concentrate of *C. papaya* seeds initiated long haul azoospermia in drowsiness monkey. Papaya additionally demonstrated the counter implantation and abortifacient effect.

Antisickling activity [44-47]

Mojisola *et al*. reported antisickling properties of *C. papaya* fruit pulp in refined water, methanol, and chloroform utilizing sodium metabisulfite in Journal of Natural product. Sickle cell sickness comes about because of a transformation in hemoglobin inside the red platelets, where a glutamic acid at sixth position is replaced by valine.

Hepatoprotective effect [48-50]

Sadeque *et al*. have revealed the hepato cautious impacts of dried natural products of papaya against carbon tetrachloride prompted hepatotoxicity and it contrasted and that of Vitamin-E. The outcomes affirmed that *C. papaya* and Vitamin E exhibited gigantic hepato security against CCl4 instigated hepatotoxicity, anyway *C. papaya* demonstrated more tremendous changes in alkaline phosphatase level than Vitamin E. Rajkapoor *et al*. reported the effect of *C. papaya* on hepatotoxicity in the biological and pharmaceutical bulletin. The ethanol and aqueous extracts of *C. papaya* showed remarkable hepatoprotective activity against CCl4 induced hepatotoxicity.

Antineoplastic activity [17,51,52]

Praveena *et al*. reported antineoplastic activity of hydroethanolic concentrate of unripe fruit of papaya utilizing animal model in Asian Journal of Pharmaceutical and Clinical Research. This examination was embraced to screen the effect of administration of different measurements of a hydroethanolic concentrate of the unripe product of papaya against Dalton's ascitic lymphoma (DAL) in Swiss albino mice. In this examination, hydroethanolic concentrate of papaya indicated significant antitumor activity against DAL cell line induced malignant ascites tumor animals.

Antioxidant and Anticancer activities of Hexane fraction from papaya male flower [53-59]

Sianipar *et al*. reported antioxidant and anticancer activities of hexane fraction from papaya male flower in Asian Journal of Pharmaceutical and Clinical Research. The antioxidant activity was completed utilizing the α,α-diphenyl-β- picrylhydrazyl technique and the anticancer potential movement was completed utilizing 3-(4,5-dimethythiazol-.

Table 2: Therapeutic uses of papaya [78]

Part	Preparation	Therapeutic uses
Peel	Utilization of peel with a little drain and nectar	Protects, soothe, and moisturize the skin
	Apply peel as the face veil for around 20 min	To get rid of blemishes on the skin and face
	Absorb cut papaya vinegar for half a month. Expel the peel, and this readiness can be connected with lemon juice to the scalp for 20 min preceding shampooing	Against dandruff
	Peel stewed in olive oil, almond oil, and rose oil, and the subsequent papaya oil rubbed into the skin and use with nectar and rose water	Works as skin toner and skin cleanser
Fruit	Eat new ready papaya toward the beginning of the day	Indigestion, clogging, farts, enhance hunger
	Apply unripe papaya squeeze on influenced zone	Pimples, skin inflammation, mouth ulcer
	Ripe fruit	Utilized to treat mouth ulcer and toothache
	Unripe fruit	Prophylactic in some Asian nations.
	Soup made from fish and nearly ripen fruit	In Southern China, lactating moms drink the soup to enhance drain stream
Leaves	Wash the leaf and cut into little pieces squeeze the mash and channel with the fabric	Can cure dengue fever
	Two tablespoons serving for every day	
	Leaves of papaya	Used for dressing wounds and injuries, treating nervous pains, and elephantoid growths
Root	A decoction shaped by heating up the external piece of the roots	Cure of dyspepsia
	The sinapism prepared from the root of the plant	Beneficial in treating the tumors of uterus
	Root infusion	Used for syphilis in Africa and reduce urine concretions
Seeds	Crisp or dry pulverized seeds	Bacteriostatic, bactericidal, and fungicidal
	Take half ground papaya seed with warm water early in the prior day breakfast, take after 2 h with 50 ml castor oil and 350 ml drain on a void stomach, and take this for 2–4 days	Expel intestinal worms
Flowers	The blossoms from the plant	Utilized as a part of treating jaundice
Latex	Latex of plant	Utilized as a part of curing psoriasis and ringworm in Cuba. It is additionally utilized as a neighborhood sterile in numerous parts of the world. Papaya latex, likewise utilized as dyspepsia cure

Table 3: Some restorative employments of papaya plant as specified in antiquated Ayurveda literature [79,80]

Parts	Medicinal aid
Latex	Anthelmintic soothes dyspepsia, cure looseness of the bowels, agony of consumes and topical utilize, draining hemorrhoids, stomachic, whooping hack
Ripe Fruits	Stomachic, stomach related, carminative, diuretic, looseness of the bowels and interminable the runs, expectorant, calming and tonic, eases stoutness, draining heaps, and injuries of the urinary tract
Unripe fruit	Purgative, diuretic, dried juice decreases developed spleen and liver, utilized as a part of snakebite to evacuate harm, abortifacient, and antibacterial action
Seeds	Carminative, emmenagogue, vermifuge, abortifacient, counter aggravation, as glue in the treatment of ringworm and psoriasis, antifertility operators in guys.
Seed Juice	Draining heaps and amplified liver and spleen
Root	Abortifacient, diuretic, checking unpredictable seeping from the uterus, heaps, antifungal movement
Leaves	Youthful leaves as vegetable, jaundice (fine glue), urinary protestations and gonorrhea (implantation), dressing wounds (crisp leaves), antibacterial action, vermifuge in colic, fever, beriberi, fetus removal (imbuement), and asthma (smoke)
Flowers	Jaundice, emmenagogue, febrifuge, and pectoral properties
Stem bark	Jaundice, hostile to hemolytic action, sore teeth (inward bark), against parasitic action

2-yl)- 2,5-diphenyl tetrazolium bromide examines to check the cytotoxic movement on WiDr (colon malignancy cell) and Vero cell (typical cell). Phytochemical screening of the hexane portion from the male blossom of papaya hints at solid triterpenoids and steroids, while the IC_{50} of cancer prevention agent esteem was 100.81±1.180 µg/ml cytotoxic impact demonstrates that the hexane portion of papaya male blossom had selectivity to WiDr cell.

Antimicrobial activity of C. papaya [60-64]

Baskaran *et al*. assessed the subjective examination of phytochemicals and antimicrobial action of different dissolvable concentrates of *C. papaya*. The antimicrobial exercises of distinctive dissolvable concentrates of *C. papaya* were tried against the Gram-positive and Gram-negative bacterial strains and growth by watching the zone of a hindrance. The Gram-positive microorganisms utilized as a part of the test were *S. aureus*, *B. cereus,* and *Micrococcus luteus*, and the Gram-negative microorganisms were *E. coli*, and *Klebsiella pneumoniae*, and the fungus used in the test were *Aspergillus niger, A.flavus, C.albicans, Candida tropicalis, Cryptococcus neoformans and Candida kefyr*.

Sumathi detailed (2014) phytochemical investigation and *in vitro* antimicrobial action of fluid and dissolvable concentrates of *C. papaya* against clinical pathogens in Int J Adv Res Biol Science. The dried powdered plant material is subjected to dissolvable extraction utilizing the solvents chilly water, high temperature water, and ethanol. Antimicrobial measure of plant remove against clinical segregates by AWD examines. Just the leaf separates demonstrated inhibitory impact against *C. albicans*, though stem and root extricates were ineffectual. Among the leaf, stem, and root separates, the leaf remove is found to display more antimicrobial movement than the stem and root.

Anti-HIV activity of C. papaya [2,65-76]

Rashed *et al*. (2013) proclaimed phytochemical screening of the polar concentrates of *C. papaya* Linn and the evaluation of the anti-HIV-1 advancement in J Appl Ind Sci. The methanol and watery concentrates of *C. papaya* were striven for their against HIV-1 activity using the syncytia advancement test. The outcomes have shown that *C. papaya* methanol and fluid concentrates have quiet limit as debilitating to HIV-1 directors.

Table 4: Synthetic segments distinguished from the leaf concentrates of *C. papaya* [81]

Sl No.	Synthetic segments	Molecular weight	Molecular formula
1	Decylene	140	$C_{10}H_2O$
2	Trans-Geranylacetone	194	$C_{13}H_{22}O$
3	Methyl tridecanoate	228	$C_{14}H_{28}O_2$
4	Palmitic acid	256	$C_{16}H_{32}O_2$
5	Methyl tetradecanoate	242	$C_{15}H_{30}O_2$
6	Myristic acid	228	$C_{14}H_{28}O_2$
7	Methyl palmitate	270	$C_{17}H_{34}O_2$
8	Hexadecanoic acid	256	$C_{16}H_{32}O_2$
9	Methyllinolelaidate	294	$C_{19}H_{34}O_2$
10	Methyl cis-6-octadecenoate	296	$C_{19}H_{36}O_2$
11	Stearic acid, methyl ester	298	$C_{19}H_{38}O_2$
12	Oleic acid	282	$C_{18}H_{34}O_2$
13	Stearic acid	284	$C_{18}H_{36}O_2$
14	15-Tetracosenoic acid	380	$C_{25}H_{48}O_2$
15	Methyl heptacosanoate	424	$C_{28}H_{56}O_2$
16	trans-13-Docosenoic acid	338	$C_{22}H_{42}O_2$
17	Methyl erucate	352	$C_{23}H_{44}O_2$
18	Methyl behenate	354	$C_{23}H_{46}O_2$
19	Heneicosanoic acid, methyl ester	340	$C_{22}H_{44}O_2$
20	Farnesyl cyanide	410	$C_{30}H_{50}$

C. papaya: Carica papaya

Nutritional value of papaya plant

Papaya is a sensibly surveyed standard thing has high nutritive respect. It is low in calories and rich in normal vitamins and minerals. The relative low calories content effects this most needed to ordinary thing for hefty individuals who are into weight diminish organization. The nutritional values and the chemical constituents of papaya plant were tabulated in Table.3 and Table.4 respectively.

CONCLUSION

Papaya plant is fundamentally utilized as the food ingredient all through the world in light of its foods grown from the ground nutritive esteem. From the above examinations about the papaya plant exhibits that its leaves, seeds, roots, blossoms, ready, and unripe fruit juices were used as a customary drug. By the conventional cases, papaya is a capable pharmaceutical. Critical measure of work has been done on the biological activities and the uses of substance constituents, consequently broad examination on its pharmacodynamics, energy, appropriate institutionalization, clinical trials are expected to abuse the healing utility to fight diverse disorders.

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AUTHOR'S CONTRIBUTIONS

All authors contributed equally to this work.

CONFLICTS OF INTEREST

The authors have none to declare.

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