IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 2, October 2025
Impact Factor: 7.67

A Brief Study on Papaya (Carica Papaya) – A Review

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Abstract: *Acne vulgaris is a multifactorial inflammatory disorder of the pilosebaceous unit, primarily affecting adolescents and young adults. Synthetic anti-acne treatments, though effective, often cause irritation and antibiotic resistance. Consequently, herbal-based formulations are gaining popularity due to their safety and efficacy. Carica papaya (papaya) is a tropical fruit-bearing plant known for its remarkable dermatological and pharmacological properties. Its bioactive compounds—papain, chymopapain, flavonoids, alkaloids, and vitamins—exhibit antibacterial, antioxidant, keratolytic, and anti-inflammatory actions. This review emphasizes the pharmacognosy, phytochemistry, pharmacological activities, and potential of papaya in polyherbal anti-acne cream formulations.*

Keywords: Carica papaya, papain, anti-acne, herbal formulation, antioxidant, polyherbal cream

I. INTRODUCTION

Acne vulgaris is one of the most prevalent skin diseases, affecting nearly 80–90% of adolescents worldwide. It results from excessive sebum secretion, follicular keratinization, bacterial colonization by Cutibacterium acnes, and inflammation of sebaceous glands [1] . Synthetic drugs such as benzoyl peroxide, isotretinoin, and antibiotics are effective but cause dryness, redness, and resistance [2] . Therefore, herbal-based formulations are increasingly preferred as safe and economical alternatives.

Among the various medicinal plants, Carica papaya Linn. (family: Caricaceae) has demonstrated strong potential in skincare and dermatological formulations. The presence of enzymes like papain and chymopapain promotes exfoliation and rejuvenation of the skin, while vitamins A, C, and E act as potent antioxidants [3] . Hence, papaya serves as a vital component in polyherbal anti-acne creams, enhancing their therapeutic efficacy.

Pharmacognosy of Papaya:

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Biological source: Carica papaya Linn.
Family: Caricaceae
Parts used: Fruit pulp, seeds, leaves, latex.
Geographical source: Native to tropical America; cultivated widely in India, Sri Lanka, and Southeast Asia.
Macroscopic features: The fruit is oblong, yellow-orange when ripe, with numerous black seeds. The leaves are large, palmate, and deeply lobed.
Microscopic features: Presence of laticifers containing papain enzyme; parenchymatous tissue rich in starch grains and calcium oxalate crystals

Properties of Papaya:

Sr. No.	Property	Description
1.	Antibacterial	Inhibits C. acnes, S. aureus and P. aeruginosa [5]
2.	Anti-inflammatory	Reduces erythema and swelling in acne lesions [6]
3.	Antioxidant	Neutralizes free radicals due to vitamins C and E [7]
4.	Keratolytic	Papain exfoliates dead cells, preventing pore blockage [8]
5.	Wound Healing	Promotes tissue regeneration and scar reduction [9]

Benefits of Papaya in Anti-Acne Cream:

- Reduces bacterial colonization on skin.
- Decreases inflammation and redness.
- Clears pores by enzymatic exfoliation.
- Promotes healing of acne scars.
- Improves skin texture and brightness.

Botanical Profile of Carica Papaya:

Sr. No.	Parameter	Description
1.	Kingdom	Plantae
2.	Family	Caricaceae
3.	Genus	Carica
4.	Species	C. papaya Linn.
5.	Common name	Papaya, Pawpaw, Papita
6.	Distribution	Tropical and subtropical regions worldwide
7.	Plant Type	Fast-growing soft-wooded, perennial herbaceous tree

Phytochemical Constituents:
The plant contains several bioactive compounds responsible for its pharmacological actions:

Sr. No.	Plant Part	Major Constituent	Pharmacological Role
1.	Fruit Pulp	Papain, chymopapain, vitamin A,C and E	Exfoliating, antioxidant
2.	Seeds	Alkaloids (carpaine), flavonoids, phenolic acid	Antimicrobial
3.	Leaves	Saponins, tannins, flavonoids, glycosides	Anti-inflammatory
4.	Latex	Proteolytic enzymes	Cleansing, healing

Mechanism of Action in Acne:

- Antibacterial Action: Papaya seed and leaf extracts inhibit C. acnes and S. aureus growth, reducing bacterial-induced inflammation [10].

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- Anti-inflammatory Effect: Flavonoids and saponins suppress inflammatory mediators, decreasing redness and swelling [11].
- Keratolytic Activity: Papain and chymopapain remove dead epithelial cells and unclog pores, preventing come done formation [12].
- Antioxidant Défense: Vitamins A, C, and E scavenge free radicals, protecting the skin from oxidative stress [13].
- Sebum Regulation: Papaya helps normalize oil secretion, maintaining balanced hydration and preventing acne formation [14].

Benefits of Carica papaya in Anti-Acne Cream:

- Enhances the cleansing and exfoliating effect of the formulation.
- Synergizes with other herbal ingredients like moringa, neem, and aloe vera.
- Improves penetration of active ingredients into the skin.
- Provides natural fragrance and emollient effect.
- Reduces post-acne hyperpigmentation and scars.

Pharmacological Actions of Papaya:

Sr. No.	Action	Mechanism
1.	Antibacterial	Inhibition of C. acnes, S. aureus [10]
2.	Anti-inflammatory	Suppression of prostaglandin synthesis [11]
3.	Antioxidant	Free radical scavenging via vitamin C and flavonoids [13]
4.	Wound Healing	Enhanced collagen synthesis and tissue regeneration [15]
5.	Exfoliating	Proteolytic enzyme activity (papain) [8]

Extraction Method:

- Collection: Fresh papaya fruit or leaves are collected and washed thoroughly.
- Drying: The material is shade-dried at 40–45°C to retain enzymatic activity.
- Powdering: Dried plant material is ground into fine powder.
- Solvent extraction: The powder is extracted with ethanol, methanol, or hydroalcoholic solvent using Soxhlet or maceration.
- Filtration & concentration: Extract is filtered and concentrated under reduced pressure.
- Storage: Stored in airtight container at low temperature for formulation use [16].

II. CONCLUSION

Carica papaya is a highly valuable medicinal plant with significant potential in the management of acne vulgaris. Its enzymes, antioxidants, and anti-inflammatory constituents act synergistically to reduce acne lesions, bacterial infection, and post-acne scarring. When incorporated into polyherbal anti-acne cream, papaya enhances the formulation's overall therapeutic and cosmetic efficacy. Further clinical studies and standardization of extract concentrations are recommended to optimize its use in modern herbal dermatology.

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