

Ethnomedicinal Use of *Carica papaya* L. for Dengue Fever: An Indian Perspective with Focus on Madhya Pradesh

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Abstract—India is one of the countries most affected by dengue fever, a mosquito-borne viral illness that often results in severe complications like thrombocytopenia. With no specific antiviral treatment, the use of traditional medicinal plants such as *Carica papaya* L. (papaya) has gained attention. In rural and tribal regions of Madhya Pradesh—especially in districts like Chhatarpur, Tikamgarh, and Panna—papaya leaf decoctions have been used for generations to manage fever, fatigue, and bleeding disorders. Scientific studies now support its role in improving platelet counts and immune response. This article reviews the traditional use of *C. papaya* in Indian households, highlights field-based evidence from Madhya Pradesh, and discusses its phytochemistry, clinical validation, and future research prospects as a plant-based therapeutic tool against dengue fever in India.

Keywords— *Carica papaya* L., dengue fever, Madhya Pradesh, traditional medicine, thrombocytopenia, Indian ethnobotany, folk therapy, platelet count

1. INTRODUCTION

Dengue is a major vector-borne disease in India, with recurrent outbreaks affecting both urban and rural populations. The disease is caused by four antigenically related serotypes of the dengue virus (DENV 1–4), transmitted by *Aedes aegypti* mosquitoes (WHO, 2022). According to WHO estimates, approximately 390 million dengue infections occur each year, with 96 million exhibiting clinical symptoms (WHO, 2022). According to the National Centre for Vector Borne Diseases Control (NCVBDC), India reported over 1.9 lakh dengue cases in 2023, with the highest burden observed in states like Uttar Pradesh, Madhya Pradesh, and Maharashtra.

In the absence of a specific antiviral drug, the treatment remains largely supportive. The rise in herbal and traditional remedies is particularly relevant in India's rural and tribal belts, where healthcare access is limited. Among several medicinal plants, *Carica papaya* L. has emerged as a potential herbal solution due to its long-standing use in folk medicine to combat febrile illnesses and bleeding disorders (Rastogi & Mehrotra, 2002).

For the present review, information regarding ethnomedicinal uses for *Carica papaya* L. in remedies for dengue fever was gathered via searching books and scientific databases including Pubmed, Elsevier, Google Scholar, Springer, etc. These searches were exclusively on ethnobotanical published data based in India mainly (Adhikari et al., 2021). A scrutiny of literature reveals that several research papers on ethnomedicinal remedies by using *Carica papaya* L. to treat skin ailments of various regions and districts of India including Madhya Pradesh have been published.

2. TRADITIONAL KNOWLEDGE AND INDIAN CONTEXT

The use of *Carica papaya* L. in traditional medicine predates its scientific validation. In Ayurvedic literature, the plant is referred to as *Erandakarkati* and is used to treat a variety of ailments including digestive disorders, menstrual irregularities, skin diseases, and fever (Rastogi & Mehrotra, 2002). The leaf, fruit, seeds, bark, and latex are all used medicinally.

Folk healers and indigenous communities in regions such as Chhatarpur, Madhya Pradesh, have used papaya leaf preparations to treat febrile illnesses and boost blood cell production. During dengue outbreaks

in rural India, families often administer fresh papaya leaf juice to affected members to mitigate symptoms like bleeding and fatigue (Prakash et al., 2020). The leaves are crushed and administered orally, either alone or in combination with other herbs, indicating deep-rooted ethnomedical belief in its healing potential.

In traditional systems like Siddha and Unani, papaya is also used to stimulate liver function and as an anthelmintic, further reflecting its systemic activity.

In Indian traditional medicine systems—Ayurveda, Siddha, Unani, and local tribal practices—*Carica papaya* L. has been recognized as a versatile medicinal plant. It is referred to in Ayurveda as *Erandakarkati* and is traditionally used to treat:

- Fever
- Indigestion
- Liver disorders
- Menstrual irregularities
- Wounds and ulcers

In various Indian states, including Tamil Nadu, Kerala, West Bengal, and Madhya Pradesh, crushed papaya leaves have been used as a home remedy to manage dengue-like symptoms, especially to combat low platelet count, fatigue, and spontaneous bleeding.

2.1. Madhya Pradesh: A Case of Indigenous Use

Madhya Pradesh is home to numerous tribal and rural communities where dependence on herbal medicines remains strong. Ethnobotanical field surveys from districts like Chhatarpur, Panna, Dindori, and Tikamgarh report the frequent use of papaya leaf juice for fever, vomiting, and blood-related conditions, particularly during monsoon seasons when dengue outbreaks are common (Patel & Verma, 2017).

Traditional healers (*vaidyas* and *ojhas*) prepare decoctions or raw juice by grinding 2–3 fresh papaya leaves, filtering the extract, and administering it twice daily for 3–5 days. The dosage and preparation are based on generations of oral transmission.

The Bundelkhand region, including Chhatarpur and surrounding areas, also reports the co-use of *Carica papaya* L. with basil (*Ocimum sanctum*) and giloy (*Tinospora cordifolia*) during febrile illnesses.

3. Phytochemical Constituents and Biological Mechanism

Papaya leaves are rich in bioactive compounds responsible for its pharmacological actions:

- Carpaine: An alkaloid that enhances platelet count and stabilizes membranes
- Flavonoids: Exhibit antioxidant and antiviral activity
- Papain & chymopapain: Enzymes aiding digestion and immune regulation
- Phenolic acids & saponins: Known for anti-inflammatory and cytoprotective effects

These compounds:

- Stimulate bone marrow progenitor cells, enhancing platelet production (Dharmarathna et al., 2013)
- Reduce vascular permeability, thus managing bleeding complications
- Modulate cytokines like TNF- α , IL-6, and IL-1 β , thereby reducing the cytokine storm seen in severe dengue (Senthilvel et al., 2014)

4. SCIENTIFIC EVIDENCE AND INDIAN CLINICAL STUDIES

4.1. Clinical Observations

In Indian hospitals, especially in Kerala, Maharashtra, and Delhi, several observational and interventional studies have confirmed that patients receiving papaya leaf extract experience:

- Faster platelet recovery
- Shorter hospitalization
- Reduced bleeding risk

Ahmad et al. (2011) reported that 25 mL of papaya leaf extract administered twice a day significantly increased platelet and white blood cell counts within 48 hours.

4.2. Clinical Trials in India

- Ching et al. (2013) and Subenthiran et al. (2013) conducted RCTs in Indian-Malaysian populations confirming efficacy in dengue management.
- A meta-analysis by Suresh Kumar et al. (2020) of 10 Indian trials concluded that papaya extract reduced mortality, hospitalization time, and the need for platelet transfusions.

5. Safety and Toxicological Profile

Despite its popularity, unregulated consumption of papaya leaf juice can pose risks:

- Nausea, vomiting, or gastritis in sensitive individuals
- Allergic skin reactions
- Potential herb-drug interactions (e.g., anticoagulants)

Standardization is a key concern. Different households prepare papaya extract using varying doses, leading to inconsistent therapeutic outcomes. Toxicology studies suggest it is safe in short durations but warrant caution in chronic use (Agarwal et al., 2017).

6. FUTURE RESEARCH AND PUBLIC HEALTH IMPLICATIONS

6.1. Need for Standardized Formulations

There is a pressing need for:

- Standard capsule/syrup formulations of papaya leaf extract with defined dosage
- GMP-certified production to ensure safety and efficacy
- Clinical trials specifically conducted in high-incidence states like Madhya Pradesh

6.2. Public Health Integration

Given its low cost and high accessibility, papaya extract could be:

- Integrated into community health centers as supportive therapy
- Educated to ASHA workers and rural health workers
- Used as part of Ayushman Bharat or National AYUSH Mission in endemic blocks of Bundelkhand and Mahakoshal regions

7. CONCLUSION

In the Indian context, especially in rural and tribal regions like Madhya Pradesh, *Carica papaya L.* serves as a vital ethnomedicinal plant with growing scientific relevance. Its ability to restore platelet counts, reduce dengue complications, and align with traditional healing systems makes it a promising candidate for integrative healthcare. However, further clinical validation, public education, and regulatory control

are necessary to translate this folk remedy into a safe, effective public health tool.

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