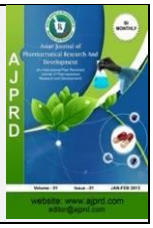
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Review Article

Parijata (Nyctanthes Arbor-Tristis Linn.): The Forgotten Fever Medicine from Indra's Garden — an Ethnopharmacological Review of Its Antipyretic and Antiviral Potential

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ABSTRACT

Objective(s): To revisit Parijata (*Nyctanthes arbor-tristis* Linn., Oleaceae) as a traditional antipyretic, to collate the ethnomedicinal, phytochemical, preclinical and clinical evidence supporting its household use in viral and intermittent fevers, and to examine why a remedy so deeply embedded in Indian cultural memory has all but vanished from contemporary therapeutic practice.

Data sources: PubMed, Scopus, Science Direct, Google Scholar and the AYUSH Research Portal were searched from inception to July 2025 using the terms 'Nyctanthes arbor-tristis', 'Parijata', 'Harsingar', 'Shephalika', 'antipyretic', 'antiviral' and 'fever', supplemented by classical Ayurvedic lexicons and standard Indian materia medica.

Study selection: Peer-reviewed *in vitro*, *in vivo*, *in silico* and clinical reports describing antipyretic, analgesic, anti-inflammatory, antiviral, antiplasmodial, immunomodulatory, hepatoprotective or toxicological outcomes for any part of the plant were included. Purely horticultural accounts and duplicated review material were excluded; forty-four sources were finally retained.

Summary of contents of the article: The review traces the Puranic narrative of Parijata from the Nandana garden of Indra to the Indian courtyard, describes the botany and vernacular identity of the tree, situates it within the classical Ayurvedic framework of *jwara* and *vishamajwara*, catalogues its iridoid glycosides and flavonoids, and appraises the pharmacological evidence relevant to fever. The traditional domestic decoction of six to seven leaves boiled in 250 mL of water is described in practical detail, together with safety considerations and the pharmacist's role in counselling and pharmacovigilance.

Conclusion: Parijata offers a biologically coherent and historically validated candidate for adjuvant management of uncomplicated viral fever. Standardised preparations and adequately powered randomised trials are now the limiting step, not the plausibility of the claim.

Keywords: *Nyctanthes arbor-tristis*; Parijata; Harsingar; antipyretic; viral fever; iridoid glycosides; Ayurveda; ethnopharmacology

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INTRODUCTION

Few symptoms have shaped human medicine as persistently as fever. It is the first thing a mother notices, the first thing a clinician measures, and the last thing to settle before a patient feels well again. In India, fever is also seasonal in a way that is almost calendrical: the monsoon recedes, the mosquitoes arrive, and outpatient departments fill with people carrying the same weary description — high temperature, aching limbs, a headache behind the eyes, no appetite. Dengue, chikungunya, influenza and a long tail of undifferentiated viral illnesses account for most of this burden, and for the majority of these conditions modern medicine still has no specific antiviral agent. What it offers is paracetamol, fluids and vigilance.

Long before that was the standard of care, an answer grew in the courtyard. The Parijata tree — *Nyctanthes arbor-tristis* Linn., of the family Oleaceae — is so common

across the Indian subcontinent that most households simply stopped noticing it. It flowers at dusk, perfumes the night, and surrenders its blossoms to the ground before sunrise. Children gather the fallen flowers for worship. Grandmothers, however, reached for the leaves. Six or seven mature leaves, washed clean and boiled down in a glass of water, produced a bitter, dark decoction that was given warm for fever, particularly the kind of fever that came with body pain severe enough to keep a person in bed (1-3).

That practice was not folklore invented in isolation. It is recorded in the classical Ayurvedic nighantus, catalogued in colonial-era materia medica, and documented in tribal pharmacopoeias from Odisha to the sub-Himalayan belt (1,2,4,5). It was also, briefly, the subject of serious pharmacological attention. In 1987, Saxena and colleagues demonstrated that the water-soluble fraction of an ethanolic leaf extract produced significant antipyretic activity against brewer's yeast-induced pyrexia in rats, together with aspirin-like antinociception (8). Over the following two decades, iridoid glycosides isolated from the plant were shown to inhibit encephalomyocarditis virus and Semliki Forest virus both *in vitro* and *in vivo* (11,12), and a clinical study in malaria reported fever clearance, a decline in tumour necrosis factor-alpha and a rise in platelet count in treated patients (14).

And then, remarkably little happened. No standardised formulation reached the market with the weight of evidence behind it. No randomised controlled trial in viral fever was undertaken. The tree remained in every second garden, and the knowledge of what to do with its leaves thinned with each generation. Parijata became ornamental — a flower for the deity, not a medicine for the patient.

This review was written to correct that drift. Our aim is threefold: to restore the cultural and classical context in which Parijata was understood as a fever medicine; to assemble, critically, the phytochemical and pharmacological evidence that bears on its antipyretic and antiviral claims; and to define what would have to be done, methodologically, before the household decoction could responsibly be offered as an adjuvant in contemporary practice. We write as a surgeon of Ayurveda and as clinical pharmacists, and we are aware that these two traditions have historically talked past each other. The Parijata seems to us a good place for them to talk.

Data sources and study selection

Electronic searches were conducted in PubMed, Scopus, ScienceDirect, Google Scholar, the AYUSH Research Portal and the DHARA database from inception to July 2025. Search terms, combined using Boolean operators, included 'Nyctanthes arbor-tristis', 'Parijata', 'Harsingar', 'Shephalika', 'night jasmine', 'antipyretic', 'antiviral', 'fever', 'dengue' and 'iridoid glycoside'. Reference lists of retrieved articles and of major reviews were hand-searched. Classical sources were consulted in standard published editions. Articles were eligible if they reported original experimental, computational or clinical data on any part of the plant, or if they provided primary ethnobotanical documentation. Horticultural and taxonomic notes without therapeutic content, conference abstracts without accessible data, and reviews that merely restated earlier reviews were excluded. Forty-four sources were finally retained, comprising original laboratory studies, two clinical reports, standard materia medica, classical texts and public-health documents.

A TREE THAT FELL FROM HEAVEN: PARIJATA IN MYTH AND CULTURAL MEMORY

To understand why Parijata survived in Indian households for two millennia, it helps to understand that it was never regarded as an ordinary tree. The Mahabharata and the Puranas count it among the five divine trees that rose from the ocean during the *Samudra Manthana*, the churning of the cosmic sea (36,38,39). Along with the Kalpavriksha, the Mandara, the Santana and the Harichandana, it was claimed by Indra and planted in Nandana, the celestial garden of Amaravati. Its fragrance, the texts say, carried for leagues.

The story that fixed it in popular memory, however, is domestic rather than cosmic. In the Harivamsa and the Vishnu Purana, the sage Narada brings a single Parijata blossom from Indra's garden and presents it to Krishna, who gives it to Rukmini. Satyabhama, learning of the gift, is wounded — not by the flower but by what it implies. She asks for the whole tree. Krishna travels to Amaravati, confronts Indra, and carries the Parijata back to Dwaraka (36,37,38).

What follows is the detail that generations of storytellers have loved. Indra, defeated, pronounces a curse: the tree will bear no fruit, and its flowers will not survive the sunrise. Krishna, faced with two aggrieved queens, plants the tree in Satyabhama's courtyard in such a way that its branches lean across the wall, so that every blossom it sheds falls into Rukmini's garden. One wife owns the tree; the other receives its flowers. The episode is the subject of Nandi Thimmana's sixteenth-century Telugu classic *Parijatapaharanamu* and of a long tradition of dance-drama across the peninsula (38,39).

The curse, of course, is an elegant piece of observational botany. *Nyctanthes arbor-tristis* genuinely flowers only at night and genuinely drops its corollas before dawn — a habit that gave Linnaeus the epithet *arbor-tristis*, the sorrowful tree, and gave the vernaculars their melancholy: the tree of sorrow, the tree of sadness, *harsingar*, *shiuli*, *shefali*. In Bengal, the appearance of shiuli blossoms on the morning grass announces Durga Puja. In temple practice across India, Parijata is one of the few flowers that may be offered after it has fallen, since it is considered to have been given rather than taken (39).

This cultural embedding had a practical consequence that is easy to underestimate. Because the tree was sacred, it was planted near homes and temples; because it was planted near homes, its leaves were available to anyone at any hour; and because it was available, its decoction became a first-line domestic response to fever long before a dispensary existed in the village. Myth, in this instance, functioned as a distribution network.

BOTANICAL PROFILE, DISTRIBUTION AND IDENTIFICATION

Nyctanthes arbor-tristis Linn. is a large shrub or small tree, usually three to ten metres tall, with rough greyish, flaky bark and distinctly quadrangular young branches. The leaves are simple, opposite, ovate with an acuminate apex, six to twelve centimetres long and two to six and a half centimetres broad, with an entire or occasionally coarsely toothed margin, and are characteristically scabrous — rough to the touch, almost like fine sandpaper, which is the quickest field test for correct identification (1,5,16).

The flowers are borne in terminal and axillary cymes of three to five, each with a small campanulate calyx and a salver-shaped corolla of five to eight white, obliquely truncate lobes surrounding a vivid orange-red tube three to five millimetres long. This orange corolla tube is diagnostic and is itself an article of commerce, having been used historically as a silk dye. Flowering runs principally from August to December in most of peninsular India. The fruit is a flat, obcordate, two-celled capsule containing a single seed in each cell (1,5).

The species is distributed through India, Nepal, Bangladesh, Pakistan, Sri Lanka and parts of South-East Asia, growing wild in the sub-Himalayan tracts and the dry deciduous forests of central India and widely cultivated in gardens, temple precincts and household courtyards. It is hardy, tolerates partial shade and poor soils, and propagates readily from seed and cuttings — a profile that explains both its ubiquity and the ease with which a household could maintain its own supply (5,16).

For any serious investigation, botanical authentication remains essential. Several unrelated plants are sold in Indian markets as 'night jasmine', and adulteration of leaf material is a recognised problem in the herbal supply chain. Voucher specimens should be deposited with a recognised herbarium and the material characterised against the monograph in the Ayurvedic Pharmacopoeia of India (35).



Figure 1: Nyctanthes arbor-tristis Linn. in cultivation, showing the simple opposite leaves, quadrangular stem, clustered green buds and the night-opened flowers with white corolla lobes and the diagnostic orange-red corolla tube.

Table 1: Vernacular names of Nyctanthes arbor-tristis Linn. across Indian languages

Language	Vernacular name(s)	Language	Vernacular name(s)
Sanskrit	Parijata, Shephalika, Shephali, Rajanihasa, Shuklangi	Marathi	Parijataka, Khurasli, Parijatak
Hindi	Harsingar, Harshringar, Seoli	Kannada	Parijata, Goli, Harsingara
Bengali	Shiuli, Shephalika	Telugu	Pagadamalle, Parijatamu
Gujarati	Harshanagar, Jayaparvati	Tamil	Pavazhamalli, Manjhapu
Odia	Gangasiuli, Singarahar	Malayalam	Pavizhamalli, Parijatakam
English	Night jasmine, coral jasmine, tree of sorrow	Urdu/Unani	Harsinghar, Gul-e-zafari

PARIJATA IN CLASSICAL AYURVEDIC LITERATURE

In the Ayurvedic corpus the plant is known chiefly as Shephalika or Parijata and is placed by Bhavamishra in the Guduchyadi Varga of the Bhavaprakasha Nighantu, a group dominated by bitter, fever-dispelling drugs (33,34). The association is not incidental. Acharya Charaka holds that *tikta rasa*, the bitter taste, is the taste of choice in *taruna jwara* — the early stage of fever — because it performs *ama pachana*, the digestion of the metabolic

residue held responsible for the febrile state. Parijata is squarely a *tikta* drug, and its classification reflects a therapeutic logic rather than a botanical convenience.Compiled from Bhavaprakasha Nighantu and standard Dravyaguna texts (33,34,35).

Table 2: Rasa Panchaka (Ayurvedic pharmacological attributes) of Parijata leaf

Parameter	Attribute	Therapeutic implication
Rasa (taste)	Tikta (bitter), Kashaya (astringent)	Ama pachana; indicated in early fever; reduces oedema and exudation
Guna (quality)	Laghu (light), Ruksha (dry)	Easy to digest during febrile anorexia; dries excessive secretion
Virya (potency)	Ushna (hot)	Promotes sweating and restores agni; relieves stiffness and body ache
Vipaka (post-digestive)	Katu (pungent)	Sustains digestive and circulatory stimulation
Karma (action)	Kapha-Vata shamaka, Jwaraghna, Shoolaghna, Shothahara, Krimighna	Antipyretic, analgesic, anti-inflammatory, anthelmintic

The classical indications cluster tightly around three domains. The first is *jwara*, fever, and specifically *vishamajwara* — irregular, remittent or relapsing fever, a category that historically subsumed malaria and much of what we would now call undifferentiated viral illness. The second is *vatarakta* and *gridhrasi*, rheumatic disorders and sciatica, for which the leaf decoction remains in regular Ayurvedic use. The third is *krimi*, worm infestation. Kirtikar and Basu, Nadkarni, and Chopra and colleagues all record the leaf juice or decoction as a remedy for obstinate fevers, arthritis, sciatica and intestinal worms, and additionally note its use as a mild cholagogue and laxative (1,2,3).

The dosage forms described are instructive because they survive almost unchanged in household practice. *Patra swarasa*, the expressed juice of fresh leaves, was given in doses of five to ten millilitres. *Patra kwatha*, the leaf decoction, was the commoner preparation, and the classical texts specifically recommend combining it with *ardraka swarasa* (ginger juice) and honey in fever — an adjustment that moderates the bitterness, adds a well-recognised antiemetic and warming agent, and makes the preparation tolerable to a patient who has no appetite (2,34). A household today that boils seven leaves and stirs in a spoon of honey is reproducing a formula with a documented textual lineage.

PHYTOCHEMISTRY

The chemistry of *Nyctanthes arbor-tristis* is dominated by iridoid glycosides, a class of monoterpenoid compounds that has repeatedly proved pharmacologically interesting across the Oleaceae and allied families. Rathore and co-workers isolated arbortristosides A, B and C from the seeds and subsequently characterised two further minor glycosides, arbortristosides D and E (11). Arborside A, B and C, 6-beta-hydroxyloganin, nyctanthoside and the cyclohexylethanoid rengyolone have been reported from the flowers, the last of these showing antiplasmodial activity in its own right (30).

Beyond the iridoids, the plant yields a reliable flavonoid fraction — nicotiflorin, astragalin and related glycosides — together with beta-sitosterol, beta-amyrin, oleanolic acid, friedelin, mannitol, tannins, saponins and a small quantity of essential oil. The orange corolla tube owes its colour to nyctanthin, a carotenoid closely related to the crocetin pigments of saffron, alongside other polyene glycosides (4,5,6,11,30).

Table 3: Principal phytoconstituents reported from different parts of Nyctanthes arbor-tristis Linn.

Plant part	Major reported constituents
Leaves	Iridoid glycosides (arbortristoside A, arborside C, 6-beta-hydroxyloganin); flavonol glycosides (nicotiflorin, astragalin); beta-sitosterol; beta-amyrin; oleanolic acid; friedelin; mannitol; tannins; glycosides; alkaloids; volatile oil
Flowers	Nyctanthin and related carotenoid glycosides; rengyolone; nyctanthoside; 6-beta-hydroxyloganin; arborside C; essential oil rich in alpha-pinene, p-cymene and methyl anthranilate
Seeds	Arbortristosides A, B, C, D and E; nyctanthic acid; glycerides of linoleic, oleic, palmitic and stearic acids; water-soluble polysaccharides
Stem bark	Alkaloids; glycosides; tannins; phenolic compounds; naringenin; beta-sitosterol
Root	Alkaloids; beta-sitosterol; glycosides; tannins

Compiled from published phytochemical investigations (4,5,6,11,26,30). Two features of this profile deserve emphasis for anyone thinking about the fever claim. First, the iridoid glycosides are water-soluble, which means the traditional aqueous decoction is a chemically rational extraction method rather than a crude approximation of one. Second, the same iridoid fraction has been independently implicated in the plant's antileishmanial, antiplasmodial, antiviral, immunomodulatory and anti-inflammatory activities (11,12,19,21,22). A single chemical class running through several apparently

unrelated pharmacological findings is usually a signal worth following.

PHARMACOLOGICAL EVIDENCE RELEVANT TO FEVER

Antipyretic activity

The foundational study remains that of Saxena and colleagues, who screened the water-soluble portion of an ethanolic leaf extract in rats. The extract produced significant antipyretic activity against brewer's yeast-induced pyrexia and significant aspirin-like antinociceptive activity in chemical and thermal models, while failing to produce morphine-like analgesia — a pattern consistent with a peripherally acting, prostaglandin-mediated mechanism rather than an opioid one (8). The same group had earlier demonstrated that the extract inhibited acute inflammatory oedema in the rat hind paw induced by carrageenan, formalin, histamine and 5-hydroxytryptamine (9). Taken together, these findings place the leaf extract in the same broad pharmacological territory as the non-steroidal anti-inflammatory drugs — which, as discussed below, is also the source of its principal safety concern.

Analgesic and anti-inflammatory activity

Subsequent work has been consistent. Kakoti and co-workers showed that the methanolic stem bark extract at 250 and 500 mg/kg produced dose-dependent analgesic and anti-inflammatory effects in standard rodent models (26). Sharma and colleagues more recently demonstrated that a hydroethanolic leaf extract suppressed cytokine-driven inflammation in Freund's adjuvant-induced arthritis, with reductions in pro-inflammatory mediators (32). This matters clinically because the complaint that drives patients with viral fever to seek care is rarely the temperature alone; it is the myalgia and arthralgia. A drug with simultaneous antipyretic and anti-inflammatory action addresses the symptom complex rather than a single number on a thermometer.

Antiviral activity

Direct antiviral evidence derives principally from the work of Gupta and colleagues, who tested the ethanolic extract, the n-butanol fraction and the purified compounds arbortristoside A and arbortristoside C against encephalomyocarditis virus and Semliki Forest virus. Pronounced inhibitory activity was observed *in vitro*; in Swiss albino mice, the ethanolic extract and the n-butanol fraction conferred protection of approximately forty and sixty per cent respectively at a daily dose of 125 mg/kg, with arbortristoside C providing greater protection than arbortristoside A. Arbortristosides B, D and E were inactive (11,12). The structure-activity distinction is itself informative: the activity is not a nonspecific extract effect but tracks specific molecules.

More recent computational work has extended these observations. Albiheyri and colleagues docked phytochemicals from the plant against Ebola virus VP35, the SARS-CoV-2 proteases, the Nipah virus glycoprotein and the chikungunya nsP2 protease, identifying arborside C, beta-sitosterol, beta-amyrin and nicotiflorin as high-affinity binders, with molecular dynamics simulation supporting the stability of the beta-amyrin-VP35 complex (13). These are hypothesis-generating studies and must be read as such; *in silico* affinity is not therapeutic efficacy. They do, however, nominate specific molecules for the wet-laboratory work that has not yet been done.

Antiplasmodial activity and the available clinical evidence

Because *vishamajwara* historically encompassed malaria, the antimalarial literature is directly relevant to the fever claim. Badam and colleagues reported *in vitro* antimalarial activity of the plant among a screen of Indian medicinal plants (17), and Misra and co-workers demonstrated activity against erythrocytic stages of *Plasmodium berghei* (18). Kumari and colleagues carried out the most rigorous chemical work, subjecting the ethanolic leaf extract to three dimensions of reverse-phase chromatographic fractionation and assaying each fraction against chloroquine-sensitive (3D7) and chloroquine-resistant (Dd2) strains of *Plasmodium falciparum*. The crude extract was only modestly potent, but purified subfractions reached half-maximal inhibitory concentrations of six to seven and a half micrograms per millilitre against both strains — within the range conventionally classified as promising. Notably, no single active molecule could be isolated, and purification sometimes reduced potency, which the authors interpreted as evidence of molecular synergy (16).

The clinical evidence, though limited, is the most interesting part of the record. Karnik and co-workers reported parasite clearance in 76.6 per cent of 120 patients treated with the traditional preparation, with acceptable clinical safety (15). Godse and colleagues followed this with an open-label exploratory study in twenty patients using a reverse-pharmacology framework. Ten patients achieved both fever clearance and polymerase chain reaction-confirmed parasite clearance; the remaining ten showed persistent but declining parasitaemia, four requiring chloroquine as a fail-safe.

Crucially, every patient showed a fall in morbidity score irrespective of parasitaemia, accompanied by a decline in tumour necrosis factor-alpha, normalisation of plasma lactate, an increase in platelet count and preserved organ function (14). The dissociation between symptomatic recovery and parasite clearance is the finding that should interest anyone studying viral fever: it suggests the plant acts substantially on the host inflammatory response, not solely on the pathogen. A rise in platelet count in a febrile, thrombocytopenic patient is precisely the outcome that households in dengue-endemic districts claim for Parijata, and it is the single most testable claim in the entire literature.

Immunomodulatory activity

Puri and colleagues demonstrated immunostimulant activity for the plant, with enhancement of both humoral and cell-mediated responses in treated animals (22).

Bhatia and Kaur separately reported that the leaf extract antagonised the immunotoxic effects of chemical pesticides, preserving immune function against chemically induced suppression (23).

In the context of a febrile viral illness, where much of the morbidity is immunopathological rather than directly cytopathic, an agent that modulates rather than merely

suppresses the inflammatory response is pharmacologically attractive.

Antioxidant, hepatoprotective and antimicrobial activity

Rathee and colleagues characterised the antioxidant capacity of the leaf extract and attributed it largely to the phenolic and flavonoid fraction (28). Hukkeri and co-workers demonstrated hepatoprotective activity of the leaves against chemically induced hepatic injury (29) — relevant both because transaminase elevation is common in dengue and other viral fevers, and because hepatotoxicity is the principal dose-limiting concern with paracetamol, the drug Parijata would be used alongside. Khatune and colleagues reported antibacterial activity and cytotoxicity for the flowers (27), and Mishra and co-workers demonstrated anti-*Malassezia* activity for the ethanolic leaf extract (31). Antileishmanial (19,20,21), antiamoebic (24) and anthelmintic (25) actions complete a notably broad antimicrobial profile.

Table 4: Summary of key pharmacological studies relevant to the antipyretic and antiviral claims

Activity	Part / extract	Model	Principal finding	Ref.
Antipyretic, analgesic	Leaf; water-soluble fraction of ethanolic extract	Brewer's yeast-induced pyrexia in rats	Significant antipyresis; aspirin-like antinociception without morphine-like analgesia; ulcerogenic on repeated dosing	(8)
Anti-inflammatory	Leaf; ethanolic extract	Carrageenan, formalin, histamine and 5-HT induced rat paw oedema	Inhibition of acute inflammatory oedema across multiple phlogistic agents	(9)
Analgesic, anti-inflammatory	Stem bark; methanolic extract	Rodent models, 250 and 500 mg/kg	Dose-dependent analgesic and anti-inflammatory effect	(26)
Antiviral	Seed; ethanolic extract, n-butanol fraction, arbortristosides A and C	EMCV and SFV, in vitro and in Swiss albino mice	Marked in vitro inhibition; 40-60% in vivo protection at 125 mg/kg; arbortristoside C superior	(11,12)
Antiviral (in silico)	Multiple phytoconstituents	Molecular docking and dynamics against Ebola VP35, SARS-CoV-2 proteases, Nipah glycoprotein, chikungunya nsP2	Arborside C, beta-sitosterol, beta-amyrin and nicotiflorin identified as high-affinity binders	(13)
Antiplasmodial	Leaf; ethanolic extract and RPHPLC fractions	P. falciparum 3D7 and Dd2 in vitro	Purified subfractions with IC50 of 6-7.5 microgram/mL against both sensitive and resistant strains	(16)
Clinical (malaria)	Traditional leaf preparation	Open-label exploratory study, 20 patients	Fever and parasite clearance in 10 of 20; fall in morbidity score in all; decline in TNF-alpha; rise in platelet count	(14)
Clinical (malaria)	Traditional leaf preparation	Clinical study, 120 patients	Parasite clearance in 76.6% with acceptable tolerability	(15)
Immunomodulatory	Leaf and whole-plant extracts	Immunostimulation assays in mice; pesticide-induced immunotoxicity	Enhanced humoral and cell-mediated response; protection against chemically induced immunosuppression	(22,23)
Hepatoprotective	Leaf extract	Chemically induced hepatic injury in rats	Restoration of liver function markers	(29)
Antioxidant	Leaf extract	In vitro radical scavenging assays	Significant free-radical scavenging attributed to phenolic and flavonoid fraction	(28)

THE HOUSEHOLD DECOCTION: PREPARATION, DOSE AND PRACTICE

The preparation that has survived in Indian homes is simple enough to be reproduced identically across generations, which is probably why it survived at all. Six to seven mature, healthy leaves are plucked, inspected for insect damage or fungal spotting, and washed thoroughly in running water. They are then added to approximately 250 millilitres of water and boiled until the volume reduces by roughly a quarter to a half, depending on regional practice. The decoction is strained and taken warm, typically twice or thrice daily during the febrile period.

Several practical refinements are worth recording because they are consistently reported and because each has a rational basis. Crushing or tearing the leaves before boiling improves extraction of the water-soluble glycosides.

Honey, added only after the decoction has cooled to drinkable temperature, makes a genuinely unpleasant bitterness tolerable, which matters in a patient with febrile anorexia. Fresh ginger juice, a classical adjunct recorded in the texts, addresses the nausea that frequently accompanies viral fever (2,34). Tulasi leaves and a few crushed peppercorns are common regional additions. The decoction is prepared fresh each time; it is not stored, and a preparation kept overnight is discarded.

Dosage in traditional practice is scaled by age rather than weight: the full glass for an adult, half for an adolescent, and a quarter-measure, heavily diluted, for younger children — though as discussed below, we do not consider the paediatric use adequately characterised. Treatment is conventionally continued for three to five days, or until the fever settles, and is specifically described as being taken alongside, not instead of, whatever other care is available.

A reviewer is obliged to note what is unsatisfactory about this. 'Six to seven leaves' is not a dose. Leaf mass varies several-fold with maturity, season and growing conditions; iridoid glycoside content varies with both. Boiling time, water hardness and the degree of reduction all affect what ends up in the glass. The traditional preparation is therefore reproducible as a ritual but not as a pharmaceutical. Any serious clinical evaluation must begin by replacing it with a standardised aqueous extract characterised against a marker compound — arbortristoside A being the obvious candidate — with defined extractive values, loss on drying, heavy metal limits and microbial load, prepared to the specifications of the Ayurvedic Pharmacopoeia of India (35).

SAFETY, PRECAUTIONS AND THE LIMITS OF SELF-MEDICATION

The most important safety signal in the literature is also the oldest. In the same 1987 study that established the antipyretic activity, Saxena and colleagues found that the extract produced gastric ulceration in rats following oral administration for six consecutive days at doses ranging from 0.5 to 8.0 g/kg (8). This is entirely consistent with the aspirin-like pharmacology described in the same paper, and it has a direct clinical implication: Parijata should be used with caution, or avoided, in patients with a history of peptic ulcer disease, in those already taking non-steroidal anti-inflammatory drugs or corticosteroids, and in anyone with upper gastrointestinal bleeding risk. The decoction should be taken after food rather than on an empty stomach. Prolonged continuous use is not supported by any evidence and is not traditionally practised.

Repeated-dose toxicity work is reassuring but limited. Sharma and colleagues assessed daily administration of a hydroethanolic leaf extract over twenty-eight days and reported an acceptable safety profile at the doses studied (32). Acute oral toxicity studies conducted under OECD guidelines have generally found the leaf extract well tolerated. There remain, however, no adequate data in pregnancy or lactation, and the plant's reported emmenagogue and purgative properties (10) argue for avoidance in pregnancy. Paediatric dosing has no pharmacokinetic basis whatsoever and rests entirely on custom.

Theoretical interactions deserve mention in a pharmacy journal. Given the documented effect on platelet count (14), concurrent use with antiplatelet or anticoagulant therapy warrants monitoring. The reported hypoglycaemic activity suggests caution with antidiabetic agents. The hepatoprotective data are encouraging, but patients taking paracetamol concurrently should still observe standard maximum daily doses; a herbal adjuvant is not licence for additional analgesia.

The most consequential precaution is not pharmacological but clinical. Fever is a symptom, not a diagnosis. A patient with persistent high-grade fever beyond three days, severe abdominal pain, persistent vomiting, bleeding from any site, lethargy, restlessness, reduced urine output or a falling platelet count requires immediate medical evaluation, not another glass of decoction. The warning signs of severe dengue are specific, well defined and time-critical (40,41). Any recommendation of Parijata — by a pharmacist, a physician or a grandmother — must be framed as supportive care within a monitored illness, and must never delay presentation.

DISCUSSION

Why did Parijata disappear from therapeutics while remaining in every second garden? The answer is instructive about how medicinal plants are lost. The 1987 ulcerogenicity finding, published in the same paper as the antipyretic result, almost certainly dampened pharmaceutical interest at precisely the moment that interest might have crystallised (8). No single active principle could be isolated — Kumari and colleagues looked systematically and failed, concluding that the activity probably resides in an interacting complex of molecules rather than one compound (16). A plant without a lead molecule is a plant without a patent, and a plant without a patent attracts no development funding. Meanwhile, paracetamol became cheap, universal and effective, and the kashaya gave way to the tablet. The knowledge did not so much get refuted as get outcompeted.

What makes the case worth reopening is the unusual convergence of independent lines of evidence. The classical texts place Parijata in a bitter, fever-dispelling drug group on the basis of a coherent internal pharmacological logic (33,34). The ethnobotanical record documents the same use across linguistically and geographically separated communities (1,2,5). Preclinical work confirms antipyretic, analgesic, anti-inflammatory, antiviral and immunomodulatory activity in standard models (8,9,12,22,26). Two clinical studies, small and methodologically modest, report fever clearance, declining inflammatory cytokines and rising platelet counts (14,15). And computational work nominates specific molecules with plausible antiviral targets (13,33). These strands were generated by different people in different decades using different methods, and they point the same way. That is not proof, but it is more than most traditional remedies can offer.

For the clinical pharmacist, this literature defines a concrete role. Patients in fever-endemic districts are already using Parijata, usually without telling anyone. Documenting that use is the first step: a medication history

that does not ask about household preparations is incomplete, and the gastrointestinal and antiplatelet considerations outlined above are exactly the kind of interaction a pharmacist exists to catch. The second step is counselling — on preparation hygiene, on taking the decoction after food, on the maximum reasonable duration of self-treatment, and above all on the red flags that mandate hospital presentation. The third is pharmacovigilance. Adverse events associated with AYUSH preparations remain substantially under-reported in India, and the national pharmacovigilance programme for Ayurveda, Siddha, Unani and Homoeopathy drugs depends on precisely the kind of ward-level observation that clinical pharmacists are placed to provide.

The limitations of the existing evidence must be stated plainly. There is no randomised controlled trial of *Nyctanthes arbor-tristis* in viral fever of any aetiology. The two clinical studies available are open-label, small, uncontrolled and conducted in malaria rather than viral illness (14,15). Preclinical studies use heterogeneous extracts — ethanolic, hydroethanolic, methanolic, aqueous — at doses that are not comparable across studies, and few report chemical standardisation of the material tested. Several frequently cited findings exist only in journals with limited indexing and uncertain peer review, a recurring problem in the Indian herbal literature that inflates apparent consensus through repeated citation of unverifiable primary sources. Publication bias almost certainly favours positive results.

The way forward is reasonably clear and does not require extraordinary resources. A standardised aqueous leaf extract should be prepared and characterised against a marker glycoside, with a stability and quality specification. Dose-ranging and formal pharmacokinetic work should follow in healthy volunteers. The definitive study would then be a randomised, double-blind, placebo-controlled trial in adults with uncomplicated dengue or undifferentiated viral fever, with standard supportive care in both arms, using time to defervescence, change in platelet count, myalgia score, analgesic consumption and rate of progression to warning signs as endpoints. The reverse-pharmacology framework developed for exactly this purpose — moving from documented clinical experience back to mechanism rather than forward from molecule to patient — fits this plant better than conventional drug discovery does (42,43,44). Parijata has already completed, informally and over two thousand years, the observational phase that such a framework requires.

Limitations of this review

This is a narrative rather than a systematic review. No formal protocol was registered, risk of bias was not assessed with a validated instrument, and no quantitative synthesis was attempted — nor would the heterogeneity of the available studies have permitted one. Searches were restricted to English-language sources and to classical texts available in published translation, and relevant material in regional-language Ayurvedic literature may therefore have been missed. Our interpretation of the mythological material is cultural rather than philological.

CONCLUSION

Parijata is not a forgotten plant. It is a forgotten medicine growing on a remembered plant, which is a different and more recoverable kind of loss. The tree that mythology brought down from Indra's garden has remained in Indian courtyards continuously ever since, and the practice of boiling six or seven of its leaves in a glass of water for fever has been transmitted through households with remarkable fidelity. The classical Ayurvedic texts explain why that practice makes sense within their own framework. Modern pharmacology, in a scattered and underfunded way, has confirmed antipyretic, analgesic, anti-inflammatory, antiviral and immunomodulatory activity, identified the responsible chemical class, and produced two small clinical studies in which fever cleared, inflammatory cytokines fell and platelet counts rose.

None of this amounts to proof that Parijata should be used in dengue or influenza. It amounts to a well-supported argument that the question deserves to be asked properly. What stands between the household decoction and a defensible clinical recommendation is not plausibility but method: standardisation of the preparation, characterisation of the dose, and a properly powered randomised trial with endpoints that matter to patients. Until that work is done, the honest position for a pharmacist or physician is neither dismissal nor endorsement, but informed supervision — asking patients whether they are using it, counselling them on how and for how long, watching for gastric intolerance and for the warning signs of severe disease, and reporting what is observed.

The flowers of the Parijata fall before sunrise and cannot be plucked; they must be gathered from the ground. There is something fitting in that for the present argument. The knowledge is already there, lying in the open where generations left it. It needs to be picked up carefully, not reinvented.

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CONFLICTS OF INTEREST

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