

Akarkara (*Anacyclus pyrethrum*): A Cross-Cultural Review of Medicinal Applications and Global Research Landscape

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Abstract - *Anacyclus pyrethrum* (Akarkara) is an important medicinal herb widely used in traditional systems of medicine such as Ayurveda, Greco-Roman medicine, Moroccan folk medicine, and Traditional Chinese Medicine. This review highlights its ethnomedicinal significance, phytochemical composition, and therapeutic potential. Recent scientific studies have validated several traditional claims and reported a wide range of biological activities, including neuroprotective, anti-inflammatory, analgesic, aphrodisiac, antidiabetic, immunomodulatory, and wound-healing effects.

Despite its long history of medicinal use, further clinical studies are required to establish its safety, efficacy, and mechanisms of action. The review identifies key research gaps and emphasizes the need to integrate traditional knowledge with modern scientific methodologies to fully explore the therapeutic potential of Akarkara.

Keywords: *Anacyclus pyrethrum*, Akarkara, Ayurveda, ethnopharmacology, neuroprotection, aphrodisiac, pellitory root

INTRODUCTION:

Akarkara is perennial plant. belonging to the family Asteraceae. It is found to North Africa and mediterranean basin but somehow it also found Way into the freditions of Arabian Peninsula, the indian subcontinent, and parts of east Asia through centuries of trade and cultural exchange

This is the plant whose root has been Chewed to Soothe a toothache in ancient. Rome, brewed into tonic to treat paralysis in medieval India, and traded along silk road spice routes from Morocco to Ching. This way the plant got slightly different name in each language. That plant is *Anacyclus Pyrethrum* known most widely today as Akarkasha or Pellitory root.

This paper sets out to map the full global picture of Akarkare's medicinal use and research presence Specifically it aims to:

1. Summarise the global body of scientific reseach On A. Pyrethrum.
2. Describe its role and preparations within Ayurvedic, Unani-Greco-Roman, and Traditional Chinease Medicine systems.
3. Evaluate the extent to which modern wester pharmacology has validated its traditional Claims.
4. Compare reginal differences in how the plant is. Used & perceived.

2. LITERATURE REVIEW

Academic interest in *Anacyclus pyrethrum* has grown substantially since the early 2000s. Researchers from Morocco, India, Algeria, Saudi Arabia, Finland, and Palestine have all contributed to a growing body of literature that spans pharmacognosy, phytochemistry, and clinical pharmacology.

2.1 Phytochemical Foundations

The medicinal potency of A. pyrethrum is rooted in its unique chemical fingerprint. Key active compounds identified in root extracts include pellitorine (an N-alkylamide responsible for the characteristic tingling sensation), anacyclin, isobutylamide, inulin, sesamin, phenylethylamide, and polyacetylenic amides. Flavonoids, tannins, alkaloids, coumarins, free fatty acids, and trace essential oils have also been reported (Kumar & Choudhary, 2016; Greger, 1978). Together, these compounds provide the chemical scaffolding for the plant's diverse biological activities.

2.2 Key Research Milestones

An early landmark was Crombie's 1954 identification of N-isobutyldienedynamide from pellitory roots, published in *Nature*, which laid the groundwork for understanding the plant's sialagogue and analgesic properties. Subsequent decades saw growing interest in its immunostimulating effects — Bendjeddou et al. (2003) demonstrated hot-water-soluble polysaccharides in the root with immunostimulatory potential, while Rimbau et al. (1999) provided early evidence of anti-inflammatory activity. From 2010 onward, the research landscape expanded rapidly.

A 2017 study by Manouze et al., published in *Frontiers in Pharmacology*, systematically confirmed anti-inflammatory, antinociceptive, and antioxidant activities in methanol and aqueous root extracts using mouse models. A 2022 systematic review in *Plants (MDPI)* synthesised published data on phytochemistry and pharmacological activities, concluding that the plant was a rich source of biologically meaningful compounds but that clinical trials were still needed (Hmidene et al., 2022).

In 2023, Ibrahim et al. published a bioassay-guided fractionation study in *BMC Complementary Medicine and Therapies*, providing arguably the most rigorous chemical analysis to date by integrating GC-MS profiling with cholinesterase inhibition and COX-2/5-LOX anti-inflammatory assays. One consistent thread across all reviews is the gap between animal-model promise and human evidence. As the evidence-tracking database *Examine.com* notes, despite numerous claimed benefits, there remains a lack of clinical evidence from human trials to support the majority of its applications (Examine, 2025).

3. METHODOLOGY

This paper is a narrative review and synthesis of existing published literature. No primary data collection or human participants were involved. The review followed a systematic search strategy across multiple source types to ensure breadth and reliability. Relevant studies and texts were identified through searches of the following databases and sources: PubMed/NCBI, ScienceDirect, *Frontiers in Pharmacology*, MDPI (*Plants*, *Molecules*), ResearchGate, Google Scholar, and Academia.edu.

Historical texts were accessed via institutional digital archives, including the National Library of Medicine's Greek Medicine historical collection and digitised editions of classical works by Dioscorides and Galen. Search terms included: 'Anacyclus pyrethrum,' 'Akarkara,' 'Aqarqarha,' 'pellitory root,' 'Anacyclus pyrethrum pharmacology,' 'Anacyclus pyrethrum Ayurveda,' 'Anacyclus pyrethrum anti-inflammatory,' and 'Anacyclus pyrethrum clinical.'

Date filters were applied to prioritise peer-reviewed articles published between 2000 and 2026, though seminal pre-2000 studies (e.g., Crombie, 1954; Rimbau, 1999) were included for historical context. Sources were evaluated for credibility based on peer-review status, journal impact, author affiliation, and methodological transparency. Traditional knowledge sources were assessed against cross-referencing with multiple independent ethnobotanical records to avoid reliance on single-source claims.

A deliberate effort was made throughout to distinguish empirically validated findings from traditional beliefs, using qualifying language such as 'traditionally believed,' 'animal studies suggest,' or 'clinically unconfirmed' where appropriate.

4. RESULTS

4.1 Ayurvedic Medicine

In the Ayurvedic tradition, *Anacyclus pyrethrum* is known as *Akarakarabha* and appears in texts from the *Laghutrayee* period onward — notably in the *Sarangdhar Samhita* and the *Bhavaprakasha* — but not in the foundational *Brihatrayee* texts (*Charaka Samhita*, *Sushruta Samhita*, or *Ashtanga Sangraha*). Scholars note that knowledge of the plant likely entered Ayurvedic literature through Arab physicians who themselves drew on Greek sources.

Classical Ayurvedic pharmacological analysis (*Dravyaguna*) classifies the root as follows: its *Rasa* (taste) is *Katu* (pungent); its *Guna* (qualities) are *Ruksha* (dry) and *Teekshna* (sharp); its *Vipaka* (post-digestive effect) is also *Katu* (pungent); and its *Veerya* (potency) is *Ushna* (hot). These properties explain its primary actions: it pacifies *Kapha* and *Vata* doshas, stimulates the nervous system (*Nadi Uttejaka*), and activates digestive fire (*Agni*). Therapeutic indications in Ayurveda span several systems. For oral health, root decoctions are used as gargles for gingivitis, dental caries, and oral ulcers. For neurological conditions, it is prescribed in facial paralysis, tremors, and hemiplegia. In reproductive medicine, dried root powder (0.5–1 g) administered with warm milk is a traditional remedy for erectile dysfunction and premature ejaculation. Its designation as a *Vajikaran Rasayana* — a category of herb that bolsters immunological resilience and reproductive vitality — gives it a particularly elevated status in the classical Ayurvedic pharmacopoeia.

Regional preparations in India include churna (root powder), avaleha (herbal jam), medicated oils for topical application, and compound formulations like Atirasadi Churna, which combines Akarkara with complementary herbs such as Ashwagandha and Kapikacchu. In Rajasthan, a uniquely regional folk practice involved giving tiny amounts of root powder to children experiencing delayed speech development.

4.2 Unani and Greco-Roman Medicine

The earliest documented use of *Anacyclus pyrethrum* in the Western world comes from Dioscorides (c. 40–90 CE), a Greek physician serving in the Roman army, who described the plant in his landmark work *De Materia Medica*. The burning, mouth-numbing quality of the root — which lent the plant its Greek-derived name from the word for fire (πῦρ, πῦρ) — was its most noted characteristic.

Galen (129–216 CE), physician to the Roman Emperor, recorded its usefulness in chronic paralysis, numbness, toothache, and intermittent fevers. These applications align closely with the humoral medical framework of the time, in which Akarkara would have been classified as an intensely heating remedy capable of dissolving cold, damp obstruction in the body. The plant's use was carried forward into the Islamic Golden Age by the Unani medical tradition.

Avicenna (Ibn Sina), Rhazes (al-Razi), and Avenzoar (Ibn Zuhr) all documented its uses in their encyclopaedic medical texts. Unani applications included toothache relief, treatment of facial palsy and epilepsy, use as a phlegmagogue (to clear mucus), aphrodisiac formulations, and colitis management. Preparations included oral compound medicines (Majoon, Tiryaaq, Jawarish) and topical liniments (Roghan), tooth powders (Sunoon), and pastes (Qairooti). The British Pharmaceutical Codex as late as 1934 listed the plant as *Pyrethri radix*, an indication that it maintained formal European pharmacopoeial recognition well into the twentieth century.

4.3 Traditional Chinese Medicine (TCM)

Anacyclus pyrethrum does not hold a formally codified position within the classical TCM materia medica, nor does it carry a dedicated Pinyin designation in the primary Chinese pharmacopoeial canons such as the *Bencao Gangmu*. However, references in the Ayurvedic and Unani literature explicitly acknowledge its Chinese usage, particularly for its aphrodisiac and warming properties. Within the conceptual framework of TCM, its profile — intensely acrid flavour, strongly warming thermal nature, and stimulating action on nervous and reproductive function — places it conceptually among herbs that tonify Yang, dispel Cold, and unblock Qi stagnation.

Chinese herbalists appear to have incorporated it into practice via trade routes from the Mediterranean and Arabian Peninsula, using it for toothache, neuralgia, and male vitality in a manner functionally consistent with neighbouring medical traditions.

It is important to flag that detailed TCM-specific meridian classifications or formal clinical protocols for *A. pyrethrum* have not been identified in accessible English or translated Chinese literature, and any such attributions made without primary Chinese-language sources risk inaccuracy.

4.4 Western Pharmacological

Research Modern pharmacological research has produced a rich — though largely preclinical — body of evidence for Akarkara's biological activities. Neuroprotection and Cognitive Enhancement: Studies have demonstrated that root extracts improve spatial learning and memory retention in rodent models, with animals showing faster maze navigation and reduced anxiety-related behaviour. A 2019 study in *Epilepsy Research* (Manouze et al.) confirmed anticonvulsive and neuroprotective effects in kainic acid-induced status epilepticus. A 2023 study by Ibrahim et al. showed meaningful acetylcholinesterase inhibitory activity, suggesting relevance to Alzheimer's disease research.

Anti-inflammatory and Analgesic Activity: Extracts from roots, seeds, leaves, and flower heads have shown up to 98% inhibition of inflammation and 94% inhibition of pain responses in animal models (Tarayrah et al., 2020). The 2017 *Frontiers in Pharmacology* study confirmed these findings using both methanol and aqueous extracts.

Reproductive and Hormonal Activity: Multiple rat studies have confirmed increased sexual behaviour, sperm count, and testosterone-related markers following oral administration of root extracts (Sharma et al., 2009; Badhe et al., 2010). A 2008 study by Pande et al. evaluated anabolic, aphrodisiac, and reproductive activities in male rats, providing one of the earliest systematic accounts of this effect.

Immunomodulation: A study published in *Drug and Chemical Toxicology* (2010, Taylor & Francis) demonstrated that petroleum ether extracts of the root stimulated both humoral and cell-mediated immunity in mice, consistent with its Ayurvedic classification as a Rasayana immunomodulator.

Safety Profile: Acute toxicity studies indicate that doses up to 2 g/kg body weight in rodents are safe, with no significant hepatotoxicity or renal damage at standard doses. Side effects at higher doses include gastrointestinal irritation, oral burning, and increased body heat — consistent with its intensely pungent chemistry.

4.5 Regional Usage Differences

Usage of *Anacyclus pyrethrum* varies considerably across geographical regions, reflecting differences in local disease burden, cultural priorities, and available knowledge traditions. In North Africa — the plant's native habitat — Moroccan and Algerian communities primarily use it for musculoskeletal and neurological conditions: rheumatism, sciatica, facial neuralgia, and paralysis.

The root is locally known as Aqar-qarha or Tigandizt, and preparations tend to be topical or decoction-based. On the Indian subcontinent, usage is far more diverse, spanning oral health, reproductive medicine, digestion, and neurological conditions. The Unani tradition dominant in Pakistan and parts of northern India emphasises its compound oral formulations for male vitality, while Ayurvedic practitioners in southern India focus on its role as a neural tonic.

In the Arabian Peninsula and the broader Islamic world, classical Unani medicine established a rich pharmacopoeia of compound preparations using Aqarqarha, ranging from tooth powders to aphrodisiac electuaries. In Europe and the British Isles, the plant's historical role was more narrowly focused on dental analgesia and salivary stimulation, a use that persisted in British herbal medicine until the early twentieth century.

5. DISCUSSION AND CONCLUSION

Few medicinal plants can claim the geographic and temporal reach of *Anacyclus pyrethrum*. From Dioscorides documenting its use in the Roman Empire to modern neuropharmacologists exploring its potential in Alzheimer's disease, the plant has maintained a continuous presence in human medicine for over two millennia. What is perhaps most striking is the degree to which traditional knowledge across very different cultures converged on the same applications — neuroprotection, pain relief, reproductive support, and oral health — long before any shared scientific framework existed.

This convergence provides a meaningful degree of cross-validation for these traditional claims and makes *A. pyrethrum* a compelling subject for further rigorous study. Modern pharmacology has made meaningful progress in identifying the active phytochemicals responsible for these effects and in demonstrating biological activity in animal models. Pellitorine and related alkylamides, flavonoids, and sesamin appear to be the primary drivers of anti-inflammatory, analgesic, and neuroprotective action.

The plant's acetylcholinesterase inhibitory activity, documented in the 2023 Ibrahim et al. study, is particularly exciting given its implications for cognitive decline and neurodegenerative disease. However, the most significant limitation of the current body of research is the near-complete absence of well-designed human clinical trials. Animal models provide a useful starting point, but the translational gap between rodent pharmacology and human therapeutics is well-documented and cannot be assumed to close automatically. Standardised extraction protocols, dosage regimens, and long-term safety data in human populations are urgently needed. Future research should prioritise: (1) Phase I and Phase II clinical trials for the most evidence-rich applications (neuroprotection, anti-inflammation, reproductive health); (2) standardised phytochemical fingerprinting across geographic varieties; (3) mechanistic studies to clarify how specific compounds interact with human receptors and metabolic pathways; and (4) ethnobotanical documentation of regional preparations before this knowledge is lost.

In conclusion, Akarkara (*Anacyclus pyrethrum*) is a plant whose therapeutic legacy spans civilisations and centuries. It sits at a genuinely exciting intersection of traditional wisdom and emerging science — a crossroads where, with the right research investment, ancient knowledge could inform genuinely novel therapeutic strategies for some of today's most challenging conditions.

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