World Journal of Pharmaceutical and Life Sciences

Impact Factor: 8.21 www.wjpls.org Coden USA: WJPLA7

NOVEL POLYHERBAL FORMULATIONS OF *SMILAX* AND *TINOSPORA CORDIFOLIA* FOR THE TREATMENT OF HEADACHE AND MIGRAINE: A REVIEW

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DOI: https://doi.org/10.5281/zenodo.18803327

How to cite this Article: Dr. Syed Gousefiroz[*1], T. Aswini[2], M.Gnanada[3], R. Tejaswari[4], K. Uma Maheswara Reddy[5], Shaik Sameer[6], B. Mahalakshmi[7], B. Nandini[8] (2026). Novel Polyherbal Formulations Of Smilax And Tinospora Cordifolia For The Treatment Of Headache And Migraine: A Review. World Journal of Pharmaceutical and Life Sciences, 12(3), 09–11.

Article Received on 20/01/2026 **Article Revised on 09/02/2026** **Article Published on 01/03/2026**

ABSTRACT

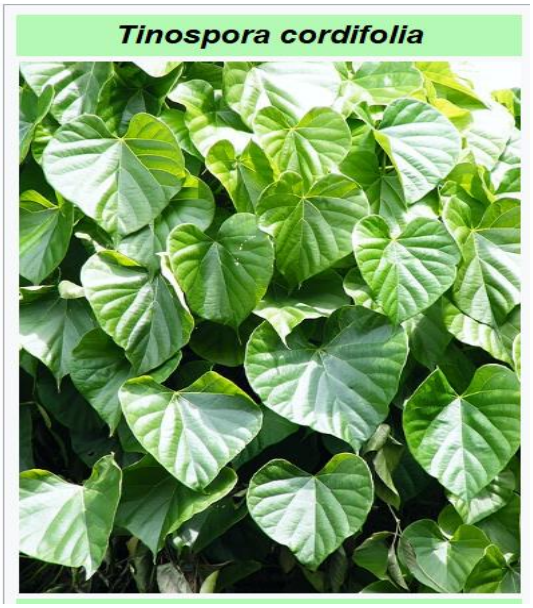
Headache and migraine are common neurological disorders characterized by recurrent pain and associated symptoms such as nausea, photophobia, and phonophobia. Although conventional pharmacotherapy provides symptomatic relief, long-term use is associated with adverse effects and recurrence. Herbal medicines and polyherbal formulations have gained attention due to their multitargeted actions and better safety profiles. *Smilax* species and *Tinospora cordifolia* are widely used in traditional medicine for inflammatory, neurological, and pain-related disorders. The present review compiles traditional knowledge and modern scientific evidence supporting the use of *Smilax* and *Tinospora* in headache and migraine. The rationale for their combination, possible mechanisms of action, formulation strategies, and future research prospects are discussed.

KEYWORDS: Migraine, Headache, Polyherbal formulation, *Smilax*, *Tinospora cordifolia*, Neuroprotection, Ayurveda.

1. INTRODUCTION

Headache disorders affect a significant proportion of the global population, with migraine ranking among the leading causes of disability. Migraine is a chronic neurovascular condition involving complex interactions between neuronal excitability, vascular changes, inflammation, and oxidative stress. Current pharmacological agents such as NSAIDs, triptans, and beta-blockers are effective but limited by side effects, contraindications, and medication-overuse headache.

Herbal medicines offer a holistic approach by targeting multiple pathways involved in disease progression. Polyherbal formulations, an integral part of Ayurvedic medicine, combine two or more herbs to enhance therapeutic efficacy through synergistic actions. *Smilax* species and *Tinospora cordifolia* possess analgesic, anti-inflammatory, antioxidant, and adaptogenic properties, making them promising candidates for migraine and headache management.



2. Methodology of the Review

This review was prepared using a systematic literature survey approach.

2.1 Data Sources

Scientific data were collected from:

- PubMed
- Google Scholar
- Scopus
- Web of Science
- Ayurvedic classical texts (Charaka Samhita, Sushruta Samhita)

2.2 Search Strategy

Keywords used included:
"*Smilax* AND migraine",
"*Tinospora cordifolia* AND headache",
"polyherbal formulation AND migraine",
"herbal treatment of headache",
"Ayurveda AND migraine".

2.3 Inclusion Criteria

- Peer-reviewed research articles
- Review articles published in English
- Studies reporting pharmacological activities related to pain, inflammation, oxidative stress, and neurological disorders
- Traditional medicinal literature relevant to headache and migraine

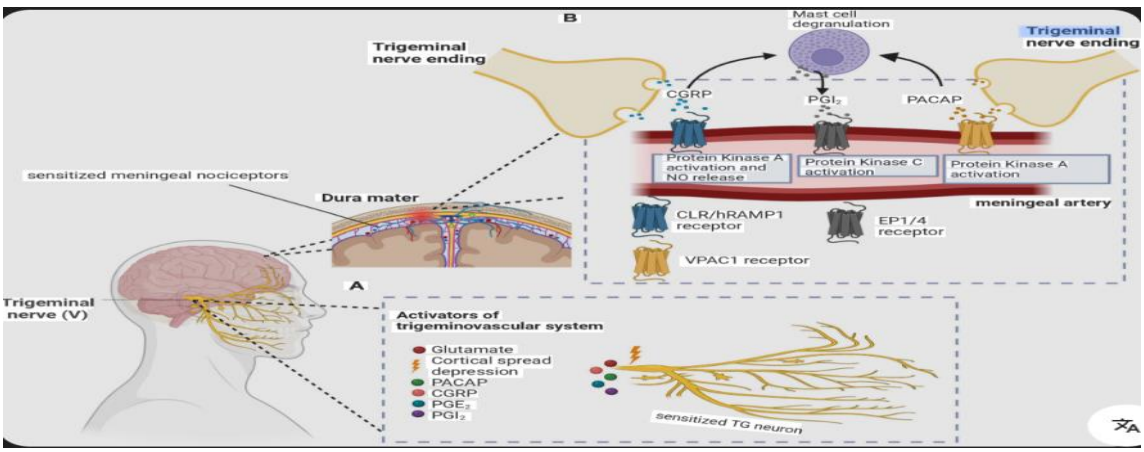
2.4 Exclusion Criteria

- Non-scientific reports
- Articles without full-text access
- Studies unrelated to neurological or pain conditions

Collected data were analyzed and compiled to evaluate the therapeutic potential of *Smilax* and *Tinospora* individually and in combination.

3. Pathophysiology of Headache and Migraine

Migraine involves activation of the trigeminovascular system, cortical spreading depression, and release of inflammatory neuropeptides such as calcitonin gene-related peptide (CGRP). Oxidative stress, mitochondrial dysfunction, and altered serotonin metabolism further contribute to disease progression. Targeting inflammation, oxidative damage, and neuronal hyperexcitability forms the basis of effective migraine management.



4. Pharmacological Profile of *Smilax*

4.1 Botanical Description

Smilax belongs to the family Smilacaceae and is widely distributed in tropical regions. Commonly used species include *Smilax glabra*, *Smilax zeylanica*, and *Smilax china*.

4.2 Phytochemical Constituents

- Flavonoids
- Steroidal saponins
- Phenolic compounds
- Alkaloids

4.3 Pharmacological Activities

Studies report that *Smilax* exhibits:

- Anti-inflammatory activity
- Analgesic effects
- Antioxidant potential
- Neuroprotective action

These properties are beneficial in reducing neurogenic inflammation and pain associated with migraine.

5. Pharmacological Profile of *Tinospora cordifolia*

5.1 Botanical Description

Tinospora cordifolia (Guduchi) is a climbing shrub belonging to the family Menispermaceae and is highly valued in Ayurveda as a Rasayana drug.

5.2 Phytochemical Constituents

- Alkaloids (berberine, magnoflorine)
- Diterpenoid lactones
- Glycosides
- Polysaccharides

5.3 Pharmacological Activities

Tinospora cordifolia is reported to possess:

- Anti-inflammatory activity
- Analgesic and anti-nociceptive effects
- Antioxidant and neuroprotective properties
- Anti-stress and adaptogenic effects

These actions are relevant in managing stress-triggered and inflammatory migraine attacks.

6. Rationale for Polyherbal Formulation

The combination of *Smilax* and *Tinospora cordifolia* provides:

- Synergistic anti-inflammatory effects
- Enhanced antioxidant defense
- Modulation of pain pathways
- Reduction of stress-related triggers
- Improved safety profile

Polyherbal formulations follow Ayurvedic principles of synergy, where combined herbs act on multiple targets simultaneously.

7. Possible Mechanisms of Action

The polyherbal formulation may exert its effect by:

- Inhibition of inflammatory mediators (COX, cytokines)
- Reduction of CGRP and nitric oxide levels
- Scavenging of free radicals
- Stabilization of neuronal membranes
- Modulation of serotonergic pathways

8. Novel Formulation Approaches

- Conventional dosage forms: tablets, capsules, syrups
- Standardized extracts with marker compounds
- Phytosome and nano-herbal delivery systems for improved bioavailability

9. Safety and Toxicological Aspects

Both herbs are traditionally considered safe. However, scientific validation through acute and chronic toxicity studies, standardization, and quality control is essential for long-term clinical use.

10. CONCLUSION

Polyherbal formulations containing *Smilax* and *Tinospora cordifolia* offer a promising, safe, and effective alternative for the management of headache and migraine. Their multitargeted pharmacological actions address key pathological mechanisms involved in migraine. Further preclinical and clinical studies are required to establish standardized formulations and therapeutic efficacy.

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