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Review Article

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"AGNIKARMA THERAPY IN MUSCULOSKELETAL AND NEUROLOGICAL CONDITIONS: EVIDENCE-BASED INSIGHTS"

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ABSTRACT

Introduction: Agnikarma, a para-surgical therapeutic procedure described in Ayurveda, employs controlled heat application using metallic rods, Pippali, or other instruments for managing musculoskeletal and neurological disorders. It is indicated in *Vatavyadhi*, *Sandhigata Vata*, sciatica, frozen shoulder, and other chronic pain conditions. Despite being ancient, its clinical relevance is being revisited due to its effectiveness in pain relief and functional recovery. **Methods:** This review critically analyzed Ayurvedic classics (*Sushruta Samhita, Ashtanga Hridaya, Chakradatta*), along with contemporary clinical studies. Literature search was conducted using PubMed, Scopus, Web of Science, AYUSH Research Portal, and Google Scholar with keywords "Agnikarma," "thermal cauterization Ayurveda," "musculoskeletal disorders Ayurveda," and "Ayurvedic pain management." Studies included clinical trials, experimental research, and case reports published in English between 1980–2024. Non-peer-reviewed material and anecdotal reports were excluded. **Results:** Classical texts emphasize Agnikarma as superior in pain management where medicines and surgery are less effective. Observations from modern studies confirm its role in osteoarthritis, lumbar spondylosis, tennis elbow, and neuropathic pain. Mechanisms include heat-induced denaturation of pain mediators, increased local circulation, reduction of stiffness, and nerve modulation. Clinical trials show significant reduction in pain scores and improved joint function compared to NSAIDs or physiotherapy alone. Evidence also suggests benefits in peripheral neuropathies and migraine. **Discussion:** Agnikarma demonstrates strong alignment with modern thermal therapies (radiofrequency ablation, diathermy, cauterization) while maintaining Ayurvedic principles of *Daha* (cauterization) and *Shamana* (palliation). Challenges include standardization of instruments, temperature regulation, and long-term safety validation. **Conclusion:** Agnikarma emerges as an evidence-based, minimally invasive, cost-effective intervention for musculoskeletal and neurological disorders. With standardization and large-scale trials, it can complement modern pain management practices globally.

KEYWORDS: Agnikarma, Ayurveda, Musculoskeletal disorders, Neurological conditions, Pain management

INTRODUCTION

Musculoskeletal and neurological disorders contribute significantly to global disability and healthcare burden[1]. Osteoarthritis, spondylosis, sciatica, frozen shoulder, and neuropathies are chronic, progressive, and often resistant to conventional pharmacotherapy[2-3]. Pain management remains a challenge due to adverse effects of long-term analgesic use and the invasive nature of surgical options[4].

Ayurveda describes *Agnikarma*—a para-surgical procedure utilizing controlled thermal cauterization—as a superior intervention for chronic pain syndromes. Acharya Sushruta documented its role in *Vatavyadhi* (neuromuscular disorders), *Sandhigata Vata* (osteoarthritis), and *Gridhrasi* (sciatica). Unlike internal medicines, Agnikarma acts locally, providing targeted and sustained pain relief. Modern studies suggest that heat application modulates nociceptive pathways, enhances circulation, and reduces inflammation, validating its ancient therapeutic principles[5-7]. The growing interest in integrative medicine has revived research on Agnikarma. Clinical studies in osteoarthritis, tennis elbow, cervical spondylosis, and migraine have reported promising results. However, systematic analysis of its evolution, clinical evidence, mechanisms, and prospects is needed[8].

This review critically evaluates Agnikarma therapy in musculoskeletal and neurological conditions, synthesizing evidence from classical Ayurvedic literature and modern research. The objectives are: to trace the classical foundations of Agnikarma, to analyze clinical applications in musculoskeletal and neurological disorders, to compare Ayurveda principles with modern biomedical evidence, to identify gaps and future research directions[9-10].

MATERIALS AND METHODS

- **Data Sources:** Primary Ayurvedic texts (*Sushruta Samhita*, *Ashtanga Hridaya*, *Chakradatta*), commentaries, and Nighantus[11].
- **Databases Searched:** PubMed, Scopus, Web of Science, AYUSH Research Portal, Google Scholar[12].
- **Keywords:** "Agnikarma," "thermal cauterization Ayurveda," "Ayurveda musculoskeletal disorders," "Agnikarma neurological conditions," "Ayurvedic pain therapy. [13]"
- **Inclusion Criteria:** Experimental studies, RCTs, systematic reviews, observational studies, and classical descriptions related to musculoskeletal and neurological disorders[14].
- **Exclusion Criteria:** Anecdotal case reports, non-peer-reviewed articles, and unrelated surgical cauterization data[15].
- **Study Types Reviewed:** Clinical trials, case series, experimental animal studies, pharmacological analyses, and integrative reviews[15].

OBSERVATION AND RESULTS

1. Classical Foundations of Agnikarma

- Described by Sushruta as superior to Bheshaja (medicinal therapy) and Shastra (surgical interventions) in certain conditions.
- Instruments: metallic rods (*Shalaka*) of gold, silver, copper, or Panchadhatu; Pippali and Godhuma for superficial burns.
- Indications: chronic pain, joint disorders, nerve-related pain, non-healing ulcers, piles, and corneal disorders.
- Contraindications: children, elderly, pregnancy, bleeding disorders, and *Pitta* dominant conditions.

2. Mechanism of Action (Ayurveda and Modern View)

- *Ayurveda:* Relieves *Vata* and *Kapha* aggravated disorders, providing immediate and sustained pain relief.
- *Modern science:* Thermal cauterization denatures pain mediators (bradykinin, prostaglandins), increases local blood flow, induces counter-irritation, and modulates nociceptive signaling.

3. Musculoskeletal Applications

a. Osteoarthritis (*Sandhigata Vata*)

- Clinical trials show significant reduction in pain (VAS scores) and stiffness.
- Improved range of motion in knee osteoarthritis compared to conventional physiotherapy.
- Mechanism: Heat reduces synovial inflammation and improves lubrication.

b. Cervical and Lumbar Spondylosis

- RCTs report effective pain reduction and improved flexibility.
- Works through muscle relaxation and nerve root decompression via local thermal effect.

c. Sciatica (*Gridhrasi*)

- Agnikarma along the affected nerve path reduces radiating pain.
- Comparable to epidural steroid injections in pain relief but without systemic side effects.

d. Frozen Shoulder and Tennis Elbow

- Case series show rapid reduction in pain and improved mobility.
- Local stimulation promotes muscle relaxation and tendon healing.

4. Neurological Applications

a. Peripheral Neuropathy

- Applied in diabetic neuropathy with reduction in burning sensation and tingling.
- Improves nerve conduction and local perfusion.

b. Migraine and Neuralgia

- Shalakagnikarma over temporal and occipital regions reduces frequency and severity of migraine attacks.
- Provides symptomatic relief in trigeminal neuralgia.

c. Stroke Rehabilitation (*Pakshaghata*)

- Used as adjunct therapy with Panchakarma.
- Enhances circulation and muscle tone in hemiplegic patients.

5. Comparative Clinical Evidence

- Studies comparing Agnikarma with NSAIDs show superior pain relief with fewer adverse effects.
- In osteoarthritis, Agnikarma plus physiotherapy yields better results than physiotherapy alone.
- Cost-effectiveness: One-time or periodic therapy compared to long-term drug use.

6. Safety and Standardization

- Reported adverse effects: mild erythema, blistering if improperly applied.
- No systemic side effects compared to NSAIDs or steroids.
- Need for standardized instruments, calibrated temperature control, and clinical guidelines.

7. Integrative Perspective

- Analogous to radiofrequency ablation, laser therapy, diathermy, and cauterization in modern medicine.
- Provides a minimally invasive, low-cost option in rural and resource-limited settings.

DISCUSSION

Agnikarma stands as one of the most scientifically rational para-surgical procedures of Ayurveda. Its emphasis on localized thermal application for chronic pain aligns with modern pain management principles. The classical rationale that heat pacifies aggravated *Vata* and *Kapha* can be interpreted in biomedical terms as modulation of nerve conduction, improved blood circulation, and reduction of inflammatory mediators[16].

Clinical evidence strongly supports its utility in musculoskeletal conditions such as osteoarthritis, spondylosis, frozen shoulder, and tennis elbow. Neurological applications, though less studied, show promise in peripheral neuropathy, migraine, and stroke rehabilitation. The therapy's rapid onset of action, safety profile, and cost-effectiveness make it a viable complementary treatment.

Comparisons with modern therapies reveal striking parallels. Agnikarma resembles radiofrequency ablation (for nerve pain), diathermy (for muscle relaxation), and cauterization (for tissue modulation). However, Agnikarma differs by its holistic integration with dosha-based diagnosis, patient selection, and personalized treatment[17-18].

Despite encouraging evidence, gaps remain. Many clinical trials are small-scale, lack blinding, and have short follow-ups. Standardization of Agnikarma instruments, procedural protocols, and outcome measures is urgently needed. Research should also focus on biochemical and imaging-based validation of its mechanisms[19].

Future prospects include integrating Agnikarma into pain clinics, developing portable devices for precise thermal delivery, and conducting multicentric RCTs. With robust evidence, Agnikarma could find global acceptance as an adjunct to modern pain management strategies[20].

CONCLUSION

Agnikarma, rooted in classical Ayurvedic wisdom, offers a unique and scientifically validated approach to managing musculoskeletal and neurological conditions. By delivering controlled heat locally, it

provides immediate and sustained relief from chronic pain, stiffness, and neuropathic symptoms. Its efficacy in osteoarthritis, spondylosis, sciatica, frozen shoulder, and peripheral neuropathy has been consistently documented in clinical studies.

The therapy demonstrates strong parallels with modern thermal interventions such as radiofrequency ablation and diathermy, yet retains its Ayurvedic foundation of dosha-based diagnosis and holistic application. Its safety profile and cost-effectiveness make it particularly relevant in resource-limited settings, where long-term pharmacotherapy or advanced surgical interventions are not feasible.

Nonetheless, challenges remain in terms of standardization, mechanistic validation, and large-scale randomized controlled trials. Addressing these will strengthen its scientific credibility and expand its integration into mainstream healthcare.

In conclusion, Agnikarma stands as an evidence-based, minimally invasive, and cost-effective therapy with immense potential in musculoskeletal and neurological care. With interdisciplinary research and policy support, it can emerge as a global model of integrative pain management.

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