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**RESEARCH ARTICLE**

# A COMPARATIVE REVIEW OF PANCHAKARMA SWEDANA THERAPY AND MODERN NSAIDS IN PAIN MANAGEMENT

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## ABSTRACT

Pain, particularly of musculoskeletal origin, is a common clinical complaint that significantly impairs functionality and quality of life. In modern medicine, non-steroidal anti-inflammatory drugs (NSAIDs) are widely utilized for their potent analgesic and anti-inflammatory properties. However, the long-term use of NSAIDs is often restricted due to adverse effects such as gastrointestinal irritation, renal impairment, and increased cardiovascular risk. In contrast, Ayurveda, the traditional Indian system of medicine, employs Swedana therapy, a type of therapeutic fomentation administered as part of the Panchakarma purification procedures. Swedana, by inducing controlled perspiration through herbal steam, boluses, or immersion methods, is believed to pacify Vata Dosha, enhance circulation, alleviate stiffness, and relieve pain without causing systemic toxicity. This review aims to comprehensively compare NSAIDs and Swedana therapy in terms of mechanism of action, efficacy in pain reduction, side-effect profile, clinical indications, and applicability in chronic versus acute pain conditions. The analysis draws from classical Ayurvedic texts, recent clinical studies, and modern pharmacological data. Results suggest that while NSAIDs offer quick symptomatic relief in acute pain, Swedana provides long-term functional improvement, particularly in chronic and degenerative conditions like osteoarthritis, cervical spondylosis, and fibromyalgia. Additionally, Swedana demonstrates a favorable safety profile, making it a valuable therapeutic tool in integrative pain management protocols. The review underscores the potential of Swedana therapy as an effective, safe, and sustainable alternative or adjunct to NSAIDs. Integrating both approaches could optimize patient outcomes, reduce drug dependency, and promote holistic healing. Further clinical trials are recommended to validate efficacy and establish standardized treatment guidelines in integrative pain care.



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# INTRODUCTION

Pain is a universal human experience and one of the most common reasons for seeking medical attention worldwide. It is not only a symptom but often a complex and multifaceted condition that affects physical, emotional, and psychological well-being. Among the various forms of pain, musculoskeletal pain—including that caused by osteoarthritis, rheumatoid arthritis, cervical and lumbar spondylosis, myalgia, and post-traumatic inflammation—is especially prevalent and often chronic. Its management poses a significant clinical challenge, particularly in the context of long-term safety and patient-centered care.[1] Contemporary medicine predominantly uses non-steroidal anti-inflammatory drugs (NSAIDs) to address pain and inflammation. These medications function by inhibiting cyclooxygenase (COX) enzymes, which prevents the production of prostaglandins—substances that mediate inflammation and pain. [2] Although NSAIDs are both effective and quick to act, their long-term use can lead to various adverse effects, including gastrointestinal irritation, peptic ulcers, kidney damage, liver damage, and cardiovascular issues. Additionally, for chronic conditions, the relief provided by NSAIDs may not result in functional improvement or a lasting resolution of the underlying causes. [3]Ayurveda, the ancient healing system from India that has been practiced for thousands of years, adopts a comprehensive approach to pain management. This system emphasizes not only alleviating symptoms but also tackling the underlying causes of ailments and restoring the balance of doshas.[4] A key therapeutic practice within Ayurveda is Panchakarma, which comprises a five-part detoxification and rejuvenation process. One of the components of Panchakarma is Swedana therapy, also known as therapeutic sudation, which targets stiffness, heaviness, and pain. Swedana stimulates sweating through several techniques, including

steam baths, herbal poultices, and warm immersions. This is believed to help release toxins (known as āma), improve blood circulation, alleviate Vata imbalances (the dosha associated with pain), and enhance flexibility in muscles and joints. [5] Swedana is frequently employed in Ayurvedic clinical practice; however, it is not widely adopted in conventional pain management systems. This is often attributed to insufficient comparative clinical research and a lack of standardization. As interest in integrative and complementary therapies continues to rise globally, it is essential to assess traditional methods like Swedana in conjunction with established biomedical treatments, such as non-steroidal anti-inflammatory drugs (NSAIDs).[6] This review aims to fill this gap by providing a comparative analysis of Swedana therapy and NSAIDs, examining their respective mechanisms of action, clinical efficacy, safety profiles, and applicability in different pain conditions. The goal is not to replace one system with another, but rather to explore opportunities for integrative approaches that combine the strengths of both Ayurvedic and modern paradigms to enhance patient care, reduce reliance on pharmacotherapy, and offer holistic and sustainable solutions to pain management.

**Aims and Objectives**

- To evaluate the pain-relieving efficacy of Swedana therapy compared to NSAIDs.
- To analyze the mechanism of action of both approaches.
- To assess the safety, side effects, and long-term usability.
- To propose a model of integrative pain management using both systems.

# MATERIALS AND METHODS

**This review is based on a comparative analysis of published literature:**

**Modern literature sources:** PubMed, Medline, Cochrane reviews on NSAIDs in pain.

**Ayurvedic texts:** Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya, and peer-reviewed Ayurvedic journals for Swedana.

**NSAIDs in Pain Management:** Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) are among the most commonly prescribed medications for relieving both acute and chronic pain, especially in inflammatory conditions. They are utilized in various clinical scenarios, such as treating musculoskeletal disorders, managing postoperative discomfort, alleviating headaches, addressing dental pain, relieving menstrual cramps, and treating arthritis. NSAIDs are generally considered first-line treatments because of their quick action, straightforward administration, and affordability. [7]

**Mechanism of Action:**[8,9] NSAIDs exert their therapeutic effects primarily through the inhibition of cyclooxygenase (COX) enzymes, which are key enzymes in the biosynthesis of prostaglandins from arachidonic acid. There are two main isoforms:

- **COX-1:** Constitutive enzyme responsible for the production of prostaglandins that maintain gastric mucosal protection, renal blood flow, and platelet aggregation.
- COX-2: Inducible enzyme that becomes upregulated during inflammation and is responsible for producing pro-inflammatory prostaglandins.

By inhibiting COX enzymes, particularly COX-2, NSAIDs reduce the synthesis of prostaglandins involved in pain, fever, and inflammation, thereby providing symptomatic relief. Selective COX-2 inhibitors (e.g., celecoxib) were developed to reduce gastrointestinal toxicity associated with non-selective NSAIDs.

**Commonly Used NSAIDs:** [10]

- Non-selective NSAIDs: Ibuprofen, Diclofenac, Naproxen, Ketorolac, Indomethacin
- COX-2 Selective Inhibitors: Celecoxib, Etoricoxib
- Combination Preparations: NSAIDs with muscle relaxants or proton pump inhibitors (to minimize GI toxicity)

**Adverse Effects and Limitations:** [11,12]

Despite their benefits, NSAIDs are associated with significant adverse effects, especially with chronic use or in susceptible populations (e.g., elderly, renal impairment, cardiovascular disease). Key risks include:

**Gastrointestinal Toxicity:**

Gastritis, gastric ulcers, bleeding, perforation. Risk increased with prolonged use, higher doses, and in combination with corticosteroids or alcohol

**Renal Impairment:** NSAIDs reduce prostaglandin-mediated vasodilation in the kidneys, potentially leading to reduced renal perfusion, acute kidney injury, and electrolyte imbalances

**Cardiovascular Risk:** NSAIDs may increase blood pressure, cause fluid retention, and in some cases, elevate the risk of myocardial infarction and stroke (especially selective COX-2 inhibitors)

**Hepatotoxicity:** Rare but possible, particularly with long-term use.

**NSAIDs and Chronic Pain: A Dilemma**

In cases of chronic conditions such as osteoarthritis and low back pain, prolonged use of nonsteroidal anti-inflammatory drugs (NSAIDs) can result in reduced effectiveness, the development of drug tolerance, and an escalation in side effects. Even when symptoms are alleviated, the underlying issues often persist and may worsen over time. As a consequence, the effectiveness of NSAIDs for long-term treatment is coming under scrutiny, leading to a movement towards multi-modal and integrative strategies for pain management. [9] Nonsteroidal anti-inflammatory drugs (NSAIDs) play a crucial role in contemporary pain management, especially for conditions characterized by acute inflammation. Nonetheless, their prolonged use can lead to various systemic side effects. Increasing recognition of these drawbacks has encouraged healthcare professionals and researchers to investigate safer and more sustainable options.

This includes exploring non-pharmacological methods and traditional treatments like Swedana from Ayurveda. Conducting comparative studies is essential to evaluate whether these traditional methods can effectively complement or replace NSAID treatment in certain clinical situations. [13]

**Swedana in Pain Management:** Swedana, also known as therapeutic sweating, is an essential external treatment within the Ayurvedic framework, particularly as part of Panchakarma, which consists of five detoxification therapies. This practice is traditionally utilized to alleviate symptoms such as stiffness, heaviness, coldness, and pain, especially when these ailments arise from an imbalance in the Vata and Kapha doshas. [14] When Swedana therapy is implemented correctly, it not only prepares the body for more profound detoxification but can also function as a standalone palliative therapy for chronic and degenerative diseases. Within the realm of Ayurvedic pain management, Swedana is significantly important, providing a natural, non-pharmacological, and holistic approach to easing musculoskeletal pain and enhancing mobility. [15]

**Classical Definition and Purpose:**

Swedana is described in Ayurvedic texts as:

Swedana therapy give relief in cold sensation, pain, stiffness, heaviness and softness of body parts.

The process which induces sweating, generates heat and facilitates the removal of vata related disorder, lighting of body, feels need of cold items and softness of body parts is termed as swedana.

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**The purpose of Swedana is to: [4]**

- Reduce stambha (stiffness)
- Alleviate shoola (pain)
- Relieve gaurava (heaviness)
- Enhance srotas (channel) openness
- Facilitate deeper penetration of medicated oils or internal treatments

**Types of Swedana: [16]**

**Swedana is broadly classified into**

**Snehayukta Sweda (with oil):**

**Used for Vata-dominant disorders with dryness and stiffness.**

- Patra Pinda Sweda (herbal leaf bolus)
- Jambira Pinda Sweda (lemon bolus)
- Shashtika Shali Pinda Sweda (medicated rice bolus)

**Ruksha Sweda (without oil):**

Used in Kapha-dominant conditions or when āma (toxins) is present.

- Valuka Sweda (sand bolus)
- Nadi Sweda (herbal steam)
- Avagaha Sweda (herbal immersion bath)

**Agni Sweda & Anagni Sweda**

- **Agni Sweda:** Heat generated through fire, steam, hot boluses
- **Anagni Sweda:** No fire used, e.g., exercise, sunbath, warm clothing

Each method is chosen based on prakriti (constitution), roga (disease type), and stage of dosha involvement.

**Mechanism of Action: [17,18]**

While classical Ayurveda attributes Swedana's effect to dosha pacification, modern science offers additional interpretations:

- Thermotherapy Effect: Application of heat causes vasodilation, improving blood circulation and oxygenation of tissues.
- Lymphatic Drainage: Enhances lymphatic flow, reducing inflammatory mediators.
- Muscle Relaxation: Heat reduces muscle spindle sensitivity, relieving spasms and stiffness.
- Pain Modulation: Increased local circulation may stimulate cutaneous thermoreceptors, triggering release of endorphins that modulate pain perception.
- Metabolic Waste Removal: Through sweating, toxins and metabolic by-products are eliminated from tissues.

**In Ayurvedic terms, Swedana:**

- Pacifies Vata (which governs movement and pain)
- Mobilizes Kapha and āma for elimination
- Enhances Agni (digestive and cellular fire), promoting tissue healing

**Clinical Benefits: [14]**

- Reduces pain and stiffness in joints and muscles
- Improves range of motion and mobility
- Enhances circulation in localized areas
- Aids relaxation and mental calmness
- Prepares the body for other Panchakarma treatments like Virechana or Basti
- Non-invasive and drug-free, reducing reliance on painkillers

**Advantages of Swedana over NSAIDs:**

| Aspect | Swedana Therapy | NSAIDs |
|---|---|---|
| Mode of Action | External, natural, detoxifying | Internal, chemical-based |
| Side Effects | Minimal | GI, renal, cardiovascular risks |
| Long-term Use | Safe and sustainable | Limited due to adverse effects |
| Holistic Benefits | Physical + psychological relief | Mainly physical symptom suppression |
| Suitable For | Chronic pain, stiffness, rehab | Acute pain, inflammation |

# DISCUSSION

Pain management is a significant focus in contemporary medicine as well as in traditional practices such as Ayurveda. This comparative analysis examines Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) and Swedana therapy,

emphasizing their distinct functions, advantages, and drawbacks in clinical settings. The goal is to combine insights from both approaches to develop a more holistic, patient-focused method for addressing pain. [19]

**Efficacy in Pain Relief:** Nonsteroidal anti-inflammatory drugs (NSAIDs) are recognized for their efficacy in quickly alleviating pain, especially in cases of acute inflammation. Their mechanism involves the inhibition of cyclooxygenase (COX) enzymes, which results in a swift decrease in pain and swelling associated with prostaglandins. Numerous clinical trials and everyday clinical experiences have repeatedly validated their advantages in managing conditions such as osteoarthritis, acute soft tissue injuries, and pain following surgical procedures. [20] In comparison, Swedana therapy demonstrates a slow yet enduring impact on chronic and degenerative pain disorders. Although its onset of action is not as rapid as that of NSAIDs, its comprehensive benefits—such as enhanced blood flow, detoxifying effects, muscle relaxation, and balancing of bodily doshas—offer prolonged relief and functional enhancement. Research indicates that Swedana substantially enhances joint mobility, reduces stiffness, and improves overall quality of life, particularly for ailments such as Sandhigata Vata (osteoarthritis), Gridhrasi (sciatica), and Avabahuka (frozen shoulder). [21]

**Mechanism of Action – Biomedical vs. Ayurvedic Perspective:** [22] The pharmacodynamics of NSAIDs is well-documented: they chemically inhibit the COX enzymes, reducing inflammation and pain. However, this also interferes with protective prostaglandins, especially those involved in gastric mucosal protection and renal perfusion. Swedana therapy's mechanism, while traditionally rooted in Ayurvedic concepts of dosha pacification and srotoshodhana (channel cleansing), can be interpreted through modern lenses as thermal therapy: [23]

- Induces local vasodilation, promoting circulation and reducing ischemia
- Enhances lymphatic drainage, clearing inflammatory mediators
- Modulates pain signals via cutaneous and subcutaneous nerve endings
- Activates parasympathetic response, promoting relaxation and mental well-being

Thus, while NSAIDs focus on blocking the pain cascade, Swedana works to restore physiological balance, making it more suitable for chronic or lifestyle-induced pain conditions.

**Safety Profile and Long-Term Use:** A significant limitation of non-steroidal anti-inflammatory drugs (NSAIDs) is their toxicity, particularly with extended or unsupervised use. Complications such as gastrointestinal bleeding, kidney dysfunction, and cardiovascular issues can occur frequently, especially in older individuals or those with pre-existing health conditions. This situation underscores the importance of regular monitoring and careful prescribing practices. [24] In contrast, Swedana therapy, when provided with appropriate supervision and tailored to a patient's constitution (prakriti) and health condition (vikriti), generally poses minimal risk of systemic side effects. Nevertheless, improper or excessive application—such as using high heat on individuals with Pitta dominance—can lead to adverse effects like fatigue, dehydration, or burns. Thus, having clinical expertise in Ayurveda is crucial for ensuring safe and effective treatment. [25]

**Current Research and Gaps:** While the pharmacology and clinical impact of NSAIDs are well-studied, research on Swedana remains relatively limited. Many studies in Ayurveda suffer from small sample sizes, lack of randomization, or insufficient blinding, limiting generalizability. Moreover, standardization of Swedana procedures (herbs used, temperature, duration) is needed for reproducibility and scientific validation. Encouragingly, recent studies published in journals such as AYU, Journal of Ayurveda and Integrative Medicine (JAIM), and clinical theses from Ayurveda colleges are beginning to provide evidence for Swedana's role in osteoarthritis, spondylosis, and fibromyalgia. These results are promising and underscore the need for multi-centric randomized controlled trials and interdisciplinary collaboration to establish Swedana in evidence-based pain management.

**Public Health and Lifestyle Considerations:** Pain transcends being a mere physical symptom and is often regarded as a biopsychosocial experience. Swedana, which combines touch, warmth, herbal pharmacodynamics, and a therapeutic environment, has the potential to enhance overall well-being, encompassing physical, mental, and emotional aspects. [26] In contrast to NSAIDs that primarily target symptoms, Swedana operates within the Ayurvedic tradition to tackle the underlying cause (hetu nirharana), restore balance among doshas, and bolster agni (digestive/metabolic fire). Given the prevalence of chronic stress, sedentary habits, and increasing reliance on medications, approaches like Swedana provide a preventive and promotive strategy, aligning with the concepts of Swasthavritta (health maintenance) and Roganutpatti (disease prevention). [27]

**Summary of Comparative Insights**

| Parameter | NSAIDs | Swedana Therapy |
|---|---|---|
| **Mechanism** | COX inhibition (anti-inflammatory) | Thermotherapy, dosha pacification |
| **Efficacy** | High in acute pain | High in chronic and degenerative pain |
| **Onset of Action** | Rapid | Gradual, sustained |
| **Side Effects** | GI, renal, cardiovascular | Minimal when properly administered |
| **Long-Term Use** | Risky | Safe and health-promoting |
| **Holistic Benefit** | Low | High (physical + mental + metabolic) |
| **Integration Scope** | Limited in Ayurveda | High potential in integrative models |
| **Cost-Effectiveness** | Variable | Cost-effective in chronic care |

# CONCLUSION

Pain, whether it is acute or chronic, has a profound impact on the physical, emotional, and functional aspects of health. Therefore, effective strategies for pain management must consider not just the symptoms but also the underlying causes, contributing factors, and the overall well-being of the patient. This comparative analysis of Panchakarma Swedana therapy and modern NSAIDs illustrates two distinct yet potentially complementary approaches to pain relief. NSAIDs are an essential component of contemporary medicine due to their ability to provide quick and reliable relief from inflammatory pain. They are particularly beneficial in situations such as acute

injuries, postoperative recovery, and inflammatory joint diseases. However, the prolonged use of NSAIDs is restricted by their systemic side effects, including gastrointestinal ulcers, kidney damage, and cardiovascular risks, which may surpass their advantages when used for chronic pain management. Additionally, NSAIDs predominantly function by inhibiting the biochemical processes of inflammation, providing symptomatic relief but failing to address deeper imbalances or the underlying sources of pain. Conversely, Swedana, a key therapy within the Ayurvedic Panchakarma framework, offers a comprehensive, personalized, and sustainable method of managing musculoskeletal and degenerative pain. It operates through mechanisms such as localized heat application, detoxification, balancing the doshas (primarily Vata), enhancing blood circulation, and boosting metabolic processes, thereby delivering long-term relief without adverse systemic effects. Swedana is particularly effective for chronic, non-inflammatory, or lifestyle-related pain, where issues such as mobility, stiffness, and structural degeneration are predominant. This review emphasizes the synergistic potential of Swedana therapy within modern pain management. By integrating Swedana with conventional medical approaches, especially in chronic care, rehabilitation, and geriatric contexts, it may be possible to decrease reliance on NSAIDs, enhance functional outcomes, and align with the international trend toward evidence-based integrative medicine. Such integrative strategies are not only clinically effective but also align with patient preferences for safer, more natural healing options.

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