

Mini Review

# Physiological and Biochemical Basis of Pain Management in Ayurveda: A Mini Review

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## Abstract

Pain is the expression of a complex network of sensory and motor mechanisms in our body, seeking correction in conditions such as exhaustion, extraction, extravasation, or external stimuli. Ayurveda proposes the management of pain in many ways. The rationale behind the use of these pain management techniques can be explored through the integration of fundamental and applied concepts from physiology and biochemistry. This article attempts to formulate a comprehensive pain management strategy to suit the needs of society, intended to fill the lacunae in evidence-based medical practice in Ayurveda.

## Introduction

Pain is the most alarming problem that a physician encounters in clinical practice. The unity in diversity of the presentation of pain hints at its unbearable and distressing nature when compared to other symptoms. From a holistic perspective, while considering pain and its management, the sensory, motor, and their integrative inputs should be addressed [1-4]. Leaving out any of these components can make the treatment unscientific and unethical from a holistic point of view. Correction has to be directed at issues such as draining out (exhaustion), physical loss (extraction), bleeding (extravasation), or hindrance from an external cause.

Pain demands an immediate and appropriate solution to enable individuals to cope with routine activities [5,6]. Shortcut solutions for pain may provide rapid relief, but can render the body susceptible to long-term side effects and potentially irreversible damage. This concern is not restricted to mainstream modern medical practice alone, as is often believed by practitioners of other systems of medicine as well as by the public. Ignorance of physiological regulatory mechanisms and biochemical principles leads many traditional practitioners to claim “no harm” and “everything is here” in clinical scenarios. To be precise, when someone claims that Ayurveda can cure any disease or that there are no side effects to Ayurvedic medicines, it is likely that such claims are either misguided or driven by ulterior motives.

Restricting a subject like pain and its management solely to a clinical emergency is as unscientific as describing pain as merely a symptom to be treated with painkillers, without considering factors such as its cause, nature, timing, and response to treatment. Going beyond routine classification and assessment, it can be observed that pain thresholds appear to be declining in society due to physical, psychological, emotional, and social factors. Hence, educating society about the nature of pain to limit the overuse of painkillers and to promote a “positive pain” culture or rational use of medicines should be an important goal. Physiology and biochemistry have a significant role in this context.

### Types of Pain

Let us consider the different types of pain encountered in clinical practice and examine how they differ in nature and severity. This helps in designing a management protocol at a broader level. Among the various classifications, the primary one is considered here. Based on this classification, pain can be of four types.

**Acute pain:** This type of pain occurs suddenly, and its fast and intense nature demands a similar approach to management. Depending on the cause of the pain and the strength of the individual, the nature and management of acute pain may vary. However, in general, acute pain is easier to understand by analyzing its presentation, and its management principles are also more straightforward compared to other types of pain [7-10].

**Subacute pain:** This is a subtype of acute pain. Pain that has been present for more than six weeks but less than three months is categorized as subacute pain. Here, the nature and severity of pain may vary due to prior treatments and the body’s corrective mechanisms, thereby complicating the management process [11].

**Chronic pain:** Pain lasting more than three months is termed chronic pain. By this stage, pain may lead to structural and functional changes in the body, requiring more intensive and prolonged management strategies. The increased duration further complicates the management process [12].

**Acute on chronic pain:** These are acute exacerbations occurring in chronic pain. Here, two factors must be considered: the factor causing chronic pain and the factor triggering its acute exacerbation. These two factors may be contradictory, making the management process more complex. However, consistent with the general Ayurvedic principle stating “treat the sthanika dosha without

disturbing the causative dosha” [13, 14] the factor causing acute exacerbation should be managed without worsening the underlying cause of chronic pain.

There are also other classifications, such as somatic pain, visceral pain, and referred pain, which indicate whether the site of pain corresponds to the actual pathological area and the type of corrective measures required for the causative factor. Regardless of the classification or analytical approach used, the final interpretation should maintain a holistic outlook in order to provide comprehensive Ayurvedic management.

### Causes of pain

The basic mechanism in the causation of pain is the key factor in deciding the diagnosis, prognosis, and treatment of a painful condition. The role of physiology and biochemistry should be highlighted here to have a better, broader understanding of the situation. This is the impression one should have before starting to formulate a treatment protocol for a painful condition. In other words, these are the fundamental principles of management of pain to be adopted, irrespective of the system of medicine.

**Chemicals:** The network system of injury, WBCs, cytokines, inflammation, and pain operates in most conditions of pain. Cytokines like prostaglandins are the causes of pain as far as the sensation of pain is concerned [15-17]. But the radical use of prostaglandin inhibitors for controlling pain doesn’t seem worthy since the cause of pain has its root beyond prostaglandins, in the physiological and biochemical needs of the body in a pathological condition. Hence, the motto should be prostaglandin inhibition and removal together with measures to help the body repair and cope with the pathological changes.

**Spasm:** From a physiological point of view, spasm has the most significant influence on the reversal of pain pathology in many conditions, especially related to the spine and visceral pain. In the case of skeletal muscles, spasm, even though it begins as a protective mechanism, hinders proper circulation and muscular functioning required to repair the injury [18]. Hence, relieving spasm has a pivotal role not only in enhancing repair and hastening the healing process but also in getting rid of pain immediately. This effect is more evident in subacute and chronic pain.

In the case of visceral pain such as renal calculus, the pain gets relieved if smooth muscle relaxation occurs. Here, the cause of pain is injury and subsequent spasm occurring in the musculature. Even though this view does

not address the root cause of pain, for the sudden relief of pain, removal of spasm is essential.

**Trauma/Damage:** The extent of trauma or injury is another factor having etiological importance. Especially if the injury is caused by an external factor, the nature of trauma determines the fate of injury and pain. The status of circulation has to be ascertained, focusing on the signs of ischemia and necrosis. Assessing tissue damage, including nerve injury, helps not only to understand the cause of pain but also to gain insight into diagnosis and prognosis, thereby helping to prepare the management schedule.

### Management Principle

Considering the type of pain and the causative factor, the management principle can be formulated. Some of the factors which help in this process are considered here.

**Ushna or Seeta (Heat or Cold application):** This is a confusing area for many practitioners, especially newcomers. The inability to guide the younger generation in the right direction is caused by a lack of clarity in the education of fundamental principles. Ayurvedic concepts are inclusive principles, while the principles of biochemistry are exclusive. Inclusive concepts can incorporate exclusive concepts from similar streams for the development of science.

Here, experienced practitioners know where to apply seeta and ushna practically. But they are reluctant to incorporate the underlying physiological or biochemical principles, on the basis of which these inclusive concepts can be better understood. i.e., Seeta application for acute pain after injury is intended to arrest bleeding and limit tissue damage occurring [19, 20]. Whereas ushna application is intended to improve circulation, thus helping to clear chemicals causing pain. Therefore, ushna is preferred over seeta in subacute and chronic cases of pain. Apart from gate control theory, the mode of action of topical applications [21] also depends upon this mechanism from a holistic point of view, i.e., by helping either to stop bleeding or to clear inflammatory products.

**Rest or Exercise:** Similar to the differentiation between seeta and ushna, the discretion between rest and exercise is also important in the healing process as well as rehabilitation of the affected part in every case of pain. The decision between rest and exercise is made depending upon the answers to two questions: whether movement hinders the healing process and whether restriction of

movement leads to structural or functional limitation of the affected part. Thus, clinical expertise in identifying the optimum level of rest and exercise is essential in the management of pain.

**Chemical inhibitors:** As already discussed, this reductionist approach followed in modern medicine is applicable to some Ayurvedic medicines also. The reluctance to admit the fact that Ayurvedic medicines too have these effects doesn't make them safer than modern medicine. Some medicines like Rasnairandadi kashaya and guggulu preparations have actions similar to NSAIDs. This means that they relieve pain to some extent by blocking prostaglandin synthesis.

Prostaglandins, apart from causing pain sensation, also serve some protective functions. They are the principal component in the barrier of gastric mucosa, which protects the stomach wall from the action of strong acidic secretions. Thus, prolonged usage of these medicines weakens the mucosal barrier and leads to hyperacidity and then progresses to peptic ulcer. To make it clear, irrational use of medicine for pain is the cause of another type of pain.

So, it is important to monitor the effect of the medicine on the patient's alimentary tract (on 'Agni', when expressed in Ayurvedic terms). Prescribing these types of medicines for joint pain or muscle pain caused by inadequate O<sub>2</sub> supply in a case of anemia is absolutely wrong. Instead, in such cases, preparations like punarnavadi kashaya are beneficial not only to treat the underlying anemia but also to avoid complications. This is the area where the inclusive concept of the 'pandu' spectrum of disorders should be applied, with due respect to the exclusive concepts of secretion, digestion, absorption, defense, nutrition, and oxygenation.

Since Ayurveda is a holistic medicine, we should take special care to prevent any adverse drug effect on any part of the body. This thought prompted the Acharya to define treatment as the management of Agni. So, remember the following points before starting the treatment for pain:

- Understand the pathology and the underlying physiology while treating any disease.
- Do not continue vatasamana kashayas for a long period of time.
- Beware of the influence of anemia or pandu in each case of vatavyadhi you are treating, and decide treatment accordingly.

- If it seems mandatory to use a powerful vatasamana kashaya and the patient has gastric discomfort, either use them with taila having protective effect or mix it with a kashaya having antacid property (e.g., Guloochyadi kashaya).

**Role of Parasurgical procedures:** The pain-relieving effects of parasurgical procedures can be utilized especially in acute and subacute pain. Procedures like agnikarma [22-24] and raktamoksha [25, 26] can be used in conditions where a sudden reduction in inflammatory products solves the cause of severe pain. Tennis elbow, plantar fasciitis, and migraine are examples of such conditions. These parasurgical procedures are intended not only to extract inflammatory products like prostaglandins but also to provide a platform for the self-repair mechanisms of the body for reversal of pathological changes.

**Role of Panchakarma:** Beyond internal medication of pain inhibitors and external application of seeta or ushna, Panchakarma has a lot to offer in the management of pain. It has a substantial role in spasm management and in limiting damage in chronic and acute-on-chronic pain.

Sneha-sweda procedures utilize the energy of heat, the medium of oil or powders, the effect of massage, and the medicinal properties of ingredients to relieve pain. This multidimensional management of pain seems to have an edge over other conventional pain management therapies, provided they are used judiciously considering underlying physiological and biochemical principles [27, 28].

The sudden effect of vaitarana vasti in many painful conditions has been highlighted by many studies. Also, the pain-relieving effect of castor oil [29] in chronic pain has been subjected to extensive studies. All these are good signs for the future of Ayurveda and pain management, provided these positive signs are coupled with understanding of fundamental principles. For example, use of castor oil for long duration is not admissible even though it provides relief for pain, owing to the damage it causes to intestinal movements.

### Conclusion

Management of pain involves complex and multidimensional measures intended to re-establish physiological and biochemical integrity. Ayurvedic assessments and treatments for pain management can be revalidated using these physiological and biochemical principles. Analyzing the principles behind the practices and thereby rejecting outdated ones can be the stepping stone toward evidence-based clinical practice.

### Conflict of Interest

Nil

### Endnotes

Nil

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