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## Credible Mode of Action of *Agnikarma* in Musculoskeletal Pain Disorders

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### ABSTRACT

*Agnikarma* is an Ayurvedic thermophysical\* therapeutic procedure which is vividly mentioned in classical texts with varied indications. It is classically indicated for *vata*, *vata kaphaj* diseases like *Gridhrasi*, *sandhigata vata*, *katishool*, *vata kantak* etc. *Agnikarma* mentions various materials like *kshoudra*, *guda*, *shalaka*, *ajashakrit* etc, but commonly DNP *Panchadhatu lauha shalaka* is extensively used in practice. Controlled heat delivery is the basis of *Agnikarma*, therapeutic effects of which are of varied dimensions. In present era musculoskeletal pain disorders is one of the most common life style disorders in society. The oral conventional treatment with non-steroidal anti-inflammatory drugs are hazardous in chronic pain disorders. *Agnikarma* is a preferable cost-effective *ayurvedic* therapy for chronic musculoskeletal pain. Its mode of action is a fact to be research upon vividly to scientifically establish this therapy pan world for the benefit of mankind.

### KEYWORDS

*Agnikarma*, *Gridhrasi*, *Panchadhatu Shalaka*



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## INTRODUCTION

*Agnikarma* or thermal cauterization is one of the ancient treatment modalities for chronic pain. It is trusted to relieve certain chronic diseases which have been failed by *bhesaj* (herbal medicines) *kshar* (alkaline cauterization), *Shastra* (surgical intervention).<sup>4</sup> Based on the location of pain and intensity of heat to be delivered, texts mention various materials viz; *pippali*, *ajashakrt*, *godanta*, *shara*, *shalaka*, *khsoudra*, *guda*, *sneha* etc for cauterization.<sup>5</sup>

In spite of its miraculous pain relief, exact the mechanism is still unknown. It is believed to act on multi-dimensional level in human body. According to *Ayurveda*, *tikshna* (penetrating), *usna* (hot), *sukshma* (subtle), *vyavayi* (spreading), *vikashi* (immediately acting) qualities of *Agnikarma*, results in mitigating *Vata* and *Kapha* by clearing the *srota*. This article attempts to throw light on the most possible mechanism of action of *Agnikarma* which is still obscure.

## AIMS AND OBJECTIVES

- To research the probable mode of action of *Agnikarma*.
- To review the scientific basis of pain relief.

## MATERIALS AND METHODS

As *Agnikarma* is known to relieve chronic pain in musculoskeletal disorders. Any form of *Agnikarma* is believed to have qualities mainly apart from the above, any heat therapy is believed to have effects on:

- Muscle relaxant
- anti-inflammatory
- soporific
- metabolism
- thermoregulation
- glandular system
- cardiovascular system

Credible scientific basis of each factor above is being discussed below:

### Muscle relaxant effect:

Rise in temperature induces muscle relaxation and increases the efficiency of muscle action as the increased blood supply ensures the optimum conditions for contraction

Muscle relaxation occurs as a result of<sup>6</sup> :

- Decreased firing rate of Type II muscle spindle afferents and gamma efferents and an increased firing rate of type II fibers of Golgi tendon organs which in turn contribute to a decrease in firing of the alpha motoneuron to the extrafusal muscle fiber, contributing relaxation.
- Heat lowers the stimulus threshold for muscle spindle activity.



Decreased muscle spasm helps to reduce pressure of the muscle on blood vessels reducing tissue perfusion and increasing blood flow.

#### **Anti-inflammatory effect:**

Anti-inflammatory effect conglomerates various factors like vasodilation and pain relief.

#### *Theory of vasodilation:*

1. Superficial heating agents such as hot packs or hot baths have the greatest effect on cutaneous blood vessels, resulting in the greatest temperature change within the first 1cm of the tissue depth.

2. Increased superficial tissue temperature results in the release of chemical mediators such as histamine and prostaglandin which result in vasodilatation occurs with the stimulation of cutaneous thermoreceptors that synapse on the cutaneous blood vessels causing the release of bradykinin to relax the smooth muscle walls resulting in vasodilation.<sup>2</sup>

3. The reduction in sympathetic activation via spinal dorsal root ganglia to reduce smooth muscle contraction, results in vasodilation at the application site and indirectly to the cutaneous blood vessels of the extremities<sup>2</sup>

These factors altogether acts for

➤ increased blood flow to the area enhancing the delivery of nutrients.

➤ more efficient removal of waste products.

➤ Reduction of ischaemia of injured tissue.

➤ hastening the natural process of repair.

#### *Hypothesis for Pain relief:*

1. Pain threshold may be elevated with localized heat application.

2. Stimulation of the cutaneous thermal receptors has been proposed to inhibit the transmission of pain at the dorsal horn of spinal cord via the Gate Control Mechanism.

3. Heat causes increased connective tissue extensibility if tendon, ligaments, scar tissue or joint capsule tissues are superficially located thereby mitigating pain.

#### **Soporific activity:**

1. Heat appears to produce definite sedative effects. The effect of heat on nerve conduction has still to be researched upon. There is evidence that any sensory excitation reaching the brain simultaneously with pain excitation results in the pain impulse being more or less attenuated.

2. Effect on nervous system can also be supported by endogenous pain inhibiting mechanism and Gate Control Theory of pain again.

Other probable effects can be justified viz;



### **Metabolic effects:**

- it is governed by the “Vant Hoff’s principle” which states – any chemical change capable of being accelerated by heat is accelerated by rise in temperature. The more the heat the more the metabolic effects seen.
- biochemical reactions both enzymatic and metabolic accelerates up to a temperature of 45 degrees
- From 39 degrees to 43 degrees enzymatic activity increases 13% for every 1 degree rise or doubles for every 10 degree increase in temperature superficial heat is purposed to effect deeper structure by conduction heat.
- Oxygen haemoglobin dissociation curve shifts to right making more oxygen available for tissue repair or exercise.
- The increase in metabolism is greatest in the region where most heat is produced, which is in the superficial tissues.

### **Thermoregulatory effects:**

- The local heat of *agnikarma* cumulatively affects increase in metabolism and generalized temperature produced as a result of stimulation of the vasomotor centre which is the thermoregulatory area.
- Heat affects the vasomotor centre and generalized dilatation of the superficial blood vessels result.

### **Glandular effects:**

- the heat exposed to the area results to stimulation of the sensory nerve endings which cause stimulation of sweat gland locally.
- As the heated blood circulates , it affects area concerned with regulation of temperature and there is increased activity of the sweat glands throughout the body.
- When generalized sweating occurs, an increased elimination of waste products takes place.

### **Cardiovascular effects:**

- on vasodilation, the peripheral resistance is reduced and this causes a fall in blood pressure.
- Heat reduces the viscosity of blood and this also tends to reduce the blood pressure.

## **DISCUSSION**

Even though the probable mode of action is *being* studied here with particular dimensions, there may be various other approaches to proof *Agnikarma* effective scientifically. Various biochemical evaluations may be done to predict any secretion of hormones like endorphins which affects pain relief. Moreover the contribution of each of the five components of the *Shalaka* should be evaluated in its heated form which requires a satisfactory



biotechnological research centre. With considerable limitations most probable mode of action is being tried evaluated. More elaborate large scale evidentially approved researches are required in this less explored section of *Shalya Tantra*.

## CONCLUSION

Agnikarma is a well-established therapy practiced for various surgical and medical diseases since Susruta's time. *Agnikarma* by *Despande* innovated *Panchadhatu lauha shalaka* uses the principle of superficial cautery. Its efficacy as *vedanahara* and *sothahara* is being scientifically reviewed in the study. Any oral remedy for analgesia has its respective adverse effects, above which *agnikarma* remains as a good choice for patients. More contemporary scientific evidence based studies are to be executed for establishment of *Agnikarma* as cost-effective as well as efficient analgesic treatment modality.



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