

Unveiling the Scientific Mechanisms of Pain Relief through *Marma* Therapy as a Non-Pharmacological Intervention

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Abstract:- This article investigates the scientific underpinnings underlying *Marma Therapy*, a core part of *Ayurveda* that provides pain alleviation through non-pharmacological interventions. Pain, a common and debilitating feeling, is frequently treated with drugs, which can have serious adverse effects and increase the risk of reliance. As the desire for alternate pain management methods grows, *Marma Therapy* emerges as a promising solution.

Marma Therapy is the exact manipulation of specific body spots known as *Marma* points, which are said to be essential for the flow of "*Prana*," or life energy. This therapy is especially useful for neuromuscular pain and other pain-related diseases such shoulder, abdomen, chest, cervical, leg, and knee pain.

The study studies old *Ayurvedic* writings as well as current research to see how *Marma Therapy* matches with modern scientific concepts, with the goal of bridging the gap between traditional wisdom and modern science. The literature review underlines *Marma importance* in controlling various types of pain and advocates for its integration into holistic healthcare. The scientific mechanisms investigated include the Gate Control Theory of Pain, nervous system activity modulation, endorphin activation, and the influence of neurotransmitters such as nitric oxide.

Clinical evidence supports *Marma Therapy's* efficacy in a variety of neuromuscular diseases, establishing it as a viable non-pharmacological treatment. This study adds to our growing understanding of integrative medicine and demonstrates *Marma Therapy's* potential to improve modern pain treatment procedures. The study recommends for further investigation and validation of *Marma Therapy* to secure its inclusion in mainstream pain management regimens, thereby increasing the quality of life for people suffering from chronic pain.

I. INTRODUCTION

Pain is a common human experience that can greatly affect quality of life, often leaving people feeling helpless. Current medications available is effective, but often come with numerous side effects and the risk of dependency. As

the search for alternative pain management methods grows, ancient healing practices are making a comeback, offering hopeful paths to overall health and well-being. *Marma Therapy*, a fundamental aspect of *Ayurveda*, is particularly noteworthy for its potential to offer non-pharmacological pain relief.

Marma Therapy stems from the ancient Indian science of *Ayurveda* and involves stimulating specific points on the body known as *Marma* points. These points, mentioned in ancient texts, are considered crucial for the flow of "*Prana*," or life energy, similar to the meridian points in traditional Chinese medicine. The practice entails precise manipulation of these points to balance the body's energy, faster healing, and improve physical and mental well-being. This therapeutic technique is highly respected in traditional contexts and is gaining attention in modern medical discussions for its application in pain management.^[1]

Chronic pain can be very debilitating, and current medications may not always be effective. As a result, alternative treatments are needed. *Marma therapy* is a non-invasive treatment that harnesses the body's natural healing abilities. It's especially useful for neuromuscular pain, where current medications may not provide adequate relief.^[2]

Historical and contemporary sources emphasize the effectiveness of *Marma therapy* in treating a variety of pain-related conditions. Specific *Marma* points can alleviate shoulder pain, stomach discomfort, chest pain, cervical discomfort, and leg and knee discomfort. Additionally, this therapy offers benefits for conditions such as myasthenia gravis, Parkinson's disease, respiratory diseases, digestive issues, and various neurological disorders. The widespread applicability of *Marma therapy* in managing neuromuscular pain and its associated symptoms positions it as a promising non-pharmacological intervention.^[3]

This study explores the scientific mechanisms that underlie the effectiveness of *Marma Therapy* in pain relief. By examining classical *Ayurvedic* texts and contemporary research, our aim is to uncover how this ancient practice aligns with modern scientific principles.

The literature review highlights the importance of *Marma therapy* in managing different types of pain, such as shoulder, abdominal, chest, cervical, leg, and knee pain.

Our goal is to bridge the gap between traditional wisdom and contemporary science, shedding light on *Marma therapy's* potential as a viable, holistic approach to pain management.

Marma therapy, rooted in ancient *Ayurvedic* tradition, has the potential to greatly influence modern pain management practices.

This research explores the mechanisms and effectiveness of *Marma therapy*, contributing to the growing understanding of integrative medicine. The narrative review highlights the significance of *Marma therapy* in easing different types of pain and supports its integration as a complementary approach in holistic healthcare.

II. METHODS

This study is based on classical *Ayurvedic* writings and commentaries from the Post Graduate Institute of Ayurveda Jodhpur, along with related research articles.

➤ Aims and objectives

- The goal is to understand the scientific mechanisms behind *Marma Therapy's* success in pain reduction.
- Evaluate *Marma Therapy* as a non-pharmacological pain management option, especially for chronic and neuromuscular conditions.
- Our goal is to connect traditional *Ayurvedic* wisdom with modern medical science, leading to a better understanding of integrative pain management approaches.

III. LITERATURE REVIEW

A. Overview of Marma Therapy

Marma is derived from Sanskrit "*Mrin Maranae*". The Sanskrit word "*Mriyatae Asminiti Marma*" says there is a potential of death or major damage to health if these points are injured. [4]

Acharya Susruta has defined the locations of these *Marma* points, as well as how they influence *Prana*. He also defines *Marma* as the spots of the body that exhibit numerous deadly signs and symptoms following catastrophic injury. These are superficial and deeply seated spots on the body that include *Mamsa, Sira, Snayu, Asthi*, and *Sandhi* where vital energy lives or flows through. [5] The total number of *Marma* is 107, including 22 on lower extremities (11 on each), 22 on upper extremities (11 on each), 12 on the thoracic region, 14 on the back, and 37 on the head and neck. [6]

As massage techniques advanced, some of these sites were employed to stimulate interior organs. As described in the *Susruta Samhita*, *Siravedha*, *Agnikarma*, and *Kshara Karma* are therapy techniques that have an effect on pathogenesis; nevertheless, they may be located elsewhere. Similarly, *Marma* points are unique places on the body that interact with many internal organs and *Srotasas*, therefore stimulating these points can have an effect on multiple areas.

Internal organs, doshas, and channels can be controlled (stimulated or suppressed) by numerous *Marma* points. [7]

B. Technique of Marma Therapy

- Identifying each *Marma* points which is stimulated according to the underlying pathology.
- Positioning of the patient - It can be performed both sitting and supine position according to the comfort of the patient.
- Stimulation of the *Marma* will be done 18 times [respiratory rate approximately 18 times /minute] in a constant rhythm by pressure and relaxation.
- Contact with *Marma* point for application of pressure is 0.8 second (one cardiac cycle) and the pressure on *Marma* should be tolerable and appreciable by the patient.
- The stimulation can be given with the pulp part of the thumb.

The same procedure is repeated three times in a day on each *Marma*. The duration of therapy is determined by a variety of criteria, including severity, disease duration, and the origin of pain.

To effectively stimulate each *Marma*, it's important to understand that the art and technique will vary based on the specific *Marma* point. To minimize the risk of complications, it's crucial to apply the appropriate pressure with caution. It's strongly recommended to seek expert supervision when performing these techniques for the first time to ensure safety and effectiveness. [8]

C. Overview of Pain

The International Association for the Study of Pain's (IASP) taxonomy task force defined pain as 'an unpleasant sensory and emotional experience associated with existing or potential tissue damage, or explained in terms of such damage'. Pain can be classified as acute (lasting less than 3 months) or chronic (lasting longer than 3 months). Aetiology divides pain into two types: nociceptive pain, which is caused by noxious stimuli stimulating nociceptors, and neuropathic pain, which is caused by nervous system failure. [10]

D. Pain Pathway

- Transduction: The stimulus is turned into electrical activity at the nerve terminal.
- Transmission refers to the spread of electrical activity.
- Modulation involves alterations in nociceptive transmission.
- Perception [11]

E. Management of Pain

After surgery, the Acute Pain Service (APS) plays a crucial role in managing short-term pain. The World Health Organization (WHO) created a three-step approach, called the 'analgesic ladder,' to manage cancer pain, which is also used for acute pain.

First, non-opioid adjuncts like paracetamol, aspirin, and NSAIDs are used. If the pain persists, mild opioids such as codeine or tramadol may be added. In cases of moderate to severe pain or persistent discomfort, stronger opioids like oxycodone, diamorphine, fentanyl, and alfentanil might be considered.

Chronic pain management involves various approaches: using drugs like NSAIDs, opioid analgesics, antidepressants, and anticonvulsants; behavioral techniques like relaxation and cognitive behavioral therapies; interventional methods such as trigger point injections, nerve block therapy, and epidural steroid injections; as well as implantable methods such as epidural and intrathecal drug delivery.^[12]

F. Pain In Ayurveda

In *Ayurveda*, a variety of terms are used to explain pain. This shows the peculiarity of pain in different clinical conditions. The word *Vedana* 'Vid Dhatu'. It means knowledge, perception, feeling, sensation, pain etc. Basically, the perception can be divided into two, *Dukha* (feeling of sorrow) and *Sukha* (feeling of happiness).^[13]

Sula is a cardinal symptom of *Vata Dosha*. This *Vata Dosha* disorder arises due to occlusion of *Vata* (*Avarana*) or due to depletion of *Dhatu* (body tissue). In *Ayurveda*, several types of pain (*Sula*) that are described in the context of vitiated *Vata* (one of the three basic elements of the body), pricking pain (*Toda*), splitting pain (*Bheda*), piercing pain (*Iyadha*), binding type pain (*Veshtana*), pain during joint movements (*Parsaran-KunjanVedana*), severe pain (*Maharaja*), etc., are present in various terminologies in the literature.^[14]

G. Pain Management Through Ayurveda

The three basic steps of *Ayurvedic* pain management are determining the causative variables (*Hetu*), analyzing the etiopathogenesis (*Samprapti*), and selecting the appropriate remedy. *Ayurvedic* treatment can be characterized as pharmacological or non-pharmacological. Pharmacological treatment consists of drug therapy using various single drugs and formulations, external therapies such as oil massage (*Abhyanga*), hot fomentation (*Swedana*), application of drug paste on affected areas, thermal cauterization (*Agni karma*), chemical cauterization (*Kshara karma*), medical leech therapy (*Jalookavacharana*), bloodletting (*Rakta moksha*), and non-pharmacological approach using trigger point pressure massage (*Marma* therapy), various yoga postures^[15]

IV. DISCUSSION

A. Clinical Studies and Evidence

- A Study on Pristha *Marma* W.S. R To Stabdhabahuta in Amsa *Marmabhighata* by Dr. Shivsharanayya M.Swamy, N.K.J Ayurvedic medical college and P.G Centre, Bidar-2010 (Dept. Of Rachana Sharir)
- A Comparative Clinical Study Of *Marma* Therapy And Agnikarma in the management of Avabahuka W.S.R. to Frozen Shoulder, by Dr. Neerja Jain, N.I.A. Jaipur-2019 (Dept. of Shalya Tantra) .

- A Comprehensive Study on *Marma* and Acupuncture Points And Evaluation Of Their Therapeutic Importance By Dr. Vivek J, Govt, Ayurvedic Medical College, Bengaluru – 2010 2011 (Dept. Of Shalya Tantra)
- A Comparative Study of Agnikarma and Therapeutic Ultrasound in The Management of Avabahuka W.S.R. To Frozen Shoulder – NIA, Jaipur-2015 (Dept. of Shalya Tantra)
- Clinico-anatomical study of “*Marma* massage Therapy’ on amsa & amsaphalaka in the management of avabahuka (frozen shoulder) –by. JITENDRA KUMAWAT PGIA,JODHPUR 2022 (Dept. of Rachana Sharir)
- A clinico-anatomical study of *Marma* massage Therapy on amsa *Marma* in mangement of stabdhabahuta w.s.r to frozen shoulder” by Dr. ABHILASHA, PGIA,JODHPUR-2021 (Dept. of Rachana Sharir)
- *Marma* Therapy in Kati Shoola (Lumbago):- A non-invasive healing Therapy , Lokesh Yadav , Priyanka Yadav , Ashok Kumar, Narinder Singh , P. Hemantha Kumar, National Institute of Ayurveda, Jaipur, Rajasthan and faculty of Ayurveda , IMS BHU, Varanasi
- *Marma* Therapy in Katigraha w.s.r. low back pain - Dr. Shishir Prasad , Dr. Renu Rao , Dr. Raman Ranjan, Gurukul Kangri Ayu College Campus, Uttarakhand Ay Univ. Dehradun

These studies, along with others, provide a growing body of evidence supporting the use of *Marma* therapy as a non-pharmacological intervention for pain management.

B. Scientific Mechanisms of Marma Therapy in Neuromuscular Pain Relief

The scientific reasons underlying *Marma* Therapy's effectiveness in pain treatment are diverse, depending on both old *Ayurvedic* concepts and new scientific understandings.

C. Gate Control Theory of Pain:

The Gate Control Theory of Pain explains how pain signals are regulated in the spinal cord on their way to the brain. It suggests that a "gate" in the spinal cord can either amplify or reduce pain signals. When the gate is open, pain signals pass through and are perceived in the brain. When the gate is closed, pain signals are restricted, and the sensation of pain is reduced. Additionally, applying a non-painful stimulus, such as light rubbing, can activate the gate control mechanism, potentially reducing the perception of pain.^[16]

The pain gate mechanism is located in the dorsal horn of the spinal cord, specifically in the Substantia gelatinosa. It modulates sensory information from primary afferent neurons. There are three types of primary neurons:

- A-β fibers for non-noxious stimuli
- A-δ fibers for sharp, intense pain
- C fibers for prolonged burning sensations

Stimulation of A- β fibers produces an inhibitory response, closing the 'pain gate'. Stimulation of A- δ or C fibers produces an excitatory response, sending pain signals to the brain. Activation of A- β fibers can reduce transmission of A- δ and C fibers.^[17]

At the spinal cord

The primary afferent neurons from the periphery synapse with second-order neurons in the spinal cord's dorsal horn. They release neurotransmitters such as glutamate, glycine, GABA, substance P, endorphins, and serotonin. These neurotransmitters modulate pain. There are two types of second-order neurons: wide dynamic range (WDR) neurons and nociceptive-specific (NS) neurons. The third-order neurons in the brainstem and diencephalon transmit the pain signal to the cerebral cortex for further modulation.

Massage therapy uses the gate control theory to reduce pain. It activates large diameter A- β nerve fibers, benefiting various conditions such as high blood pressure, sleep, relaxation, depression, and stiffness. Additionally, stimulating *Marma* points may activate the body's natural pain-blocking mechanisms, reducing the sensation of pain. This could benefit cardiac patients by minimizing the need for pharmaceuticals and potential side effects.^[18]

D. Modulation Of Nervous System Activity

Marma Therapy has the potential to modify nervous system activity, thereby reducing pain perception and promoting relaxation by affecting the function of neurons responsible for transmitting pain signals, ultimately diminishing the intensity of perceived pain

Endorphin Activation: A gentle massage can trigger the release of endorphins, the body's natural painkillers, which are also released during pleasurable activities like exercise, massage, eating, and sex. Endorphins play a key role in pain relief, stress reduction, and enhancing overall well-being. The term "endorphin" originates from the combination of "endogenous," meaning within the body, and "morphine," an opiate pain reliever, illustrating that endorphins serve as natural pain relievers.^[19]

E. Influence Of Neurotransmitters

Nitric oxide widens blood vessels, increasing blood supply and lowering blood pressure. It also protects tissues from damage caused by reduced blood supply. Additionally, it acts as a neurotransmitter and is involved in the function of certain neurons that affect smooth muscle. Sildenafil (Viagra) works by increasing the level of cGMP, a compound involved in nitric oxide signaling. Nitric oxide also plays a role in maintaining vessel health by preventing vascular smooth muscle contraction and growth, and by inhibiting platelet clumping and white blood cell adhesion to blood vessel walls. Impaired nitric oxide pathways are often observed in individuals with atherosclerosis, diabetes, or hypertension. Furthermore, nitric oxide is involved in the regulation of blood vessel dilation, blood flow, blood

pressure, and kidney control of extracellular fluid balance. Lastly, nitric oxide also contributes to the erection of the penis and clitoris.^[20]

F. Implications For Pain Management

The findings from this study suggest that *Marma* therapy holds significant potential as an alternative or complementary approach to conventional pain management strategies. By leveraging ancient *Ayurvedic* principles and modern scientific understandings, *Marma* therapy can offer a holistic, non-invasive, and effective solution for individuals suffering from neuromuscular pain.

V. CONCLUSION

Marma therapy combines traditional knowledge with modern technology, providing promising non-pharmacological pain management options. The scientific mechanisms supporting its efficacy include pain pathway modification, activation of natural pain-blocking systems, and neurotransmitter release. Clinical data supports its use in a variety of neuromuscular diseases. As interest in integrative medicine rises, *Marma* therapy emerges as a feasible and effective option for improving the quality of life for people suffering from chronic pain. Future study should continue to explore and evaluate the therapeutic effects of *Marma* treatment, ensuring its inclusion in mainstream pain management procedures.

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