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Review Article

MARMA THERAPY - A HEALING TOUCH FOR PAIN WITH GATE CONTROL THEORY AND NEUROMODULATION TECHNIQUE

Chaudhari Pranali[1]*, Rita Marwaha[2], Nisha Bhalerao[3]
*[1]Post Graduate Scholar, [2]Professor & HOD, [3]Associate Professor, Dept. Of Rachna Sharir, Pt. Khushilal Sharma Govt. Ayurveda College, Bhopal, Madhya Pradesh, India.

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ABSTRACT

Ayurveda is Indian traditional healing system. The science of *Marma*, is an holistic approach of Ayurveda for preventive and curative aspects of various diseases. *Marma* points are centres of *Prana* or vital force, when stimulated appropriately, *Marmas* can modify the functional conditions of body. Different techniques and procedures are used to stimulate *Marma* points. *Prana* or energy flow is channelise, leading to a state of physical, mental, and spiritual well-being. *Marma* therapy aims to provide instant relief from pain. Pain is defined as condition caused by stimuli that go beyond the intensity threshold for sensory nerve endings. Peripheral receptor activation triggers neuronal impulses, which induce pain within the higher cerebral centres. If someone is exposed to a painful (noxious) stimulus, administering a non-noxious stimulation by *Marma* therapy can help activate the gate control mechanism and reduce the sensation of pain. *Marma* therapy can be considered an ancient neuromodulation technique that emphasizes the connection between the body's energy points and overall well-being. Neuromodulation is the alteration of nerve activity through targeted delivery of a stimulus to specific neurological sites in the body. In this article, the scholar attempts to explore the science behind *Marma* therapy and its effectiveness in the pain management. By harnessing the power of touch and energy, *Marma* therapy provides a healing touch for those seeking relief from pain and promotes overall wellness.

INTRODUCTION

Marma is etymologically derived from the Sanskrit root word *'Mri* (*Ek*)', which expresses the vital component of the body. According to *Acharya Sushruta*, *Marma* points are the junction of five anatomical structures i.e., *Mamsa* (muscle), *Sira* (vessels), *Snayu* (ligaments), *Asthi* (bone) and *Sandhi* (joints). According to *Ashtang Hriday Sharira Sthana* 4, these are very important vital places, that are the 'seats of life' (*Prana*- the vital life force).[1] Stimulation of *Marma* points channelises *Prana Vayu* and maintains equilibrium of *Doshas*.[2]

Marma points when properly stimulated leads to flow of *prana* or vital energy, which results in the desirable therapeutic outcomes. *Prana* can be guided to clear obstructions, enhance energy flow, access latent energy stores, and establish links with the higher forces of nature and life by manipulating *Marmas*.[3] There are 107 *Marma* points located throughout the body. According to site, *Marmas* are situated at *Udara* (thorax and abdomen), *Prishta* (back), *Shakha* (extremities) and *Urdhvajatru* (neck and head) region. Anatomically speaking, *Marmas* can be further classified as *Mamsa-Marma, Sira Marma, Snayu Marma, Sandhi-Marma,* and *Asthi-Marma*, which correspond to the *Marma* of muscle, blood vessel, ligament, joint, and bone, respectively.

These points located at specific anatomical sites where more than two structures converge i.e., junctions of bones, muscles, ligaments, tendons, blood vessels, nerves, etc. These points of convergence constitute areas of high sensitivity and vulnerability, making them susceptible to injury and stress. When these sites, i.e., the *Marma* points, are damaged, the result might be lethal. Keeping this principle in mind,

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one should try to use *Marma Chikitsa* to treat different bodily ailments. Evidence-based clinical *Marma*-related data was produced on certain conditions like lumbar pain, radiating leg pain, lumbago, rheumatoid arthritis, *Ama*, knee joint pain, cervical spondylosis, headache, etc.[4] Researchers also made reviews of *Marma* therapy, and concluded that it assisted in diseases of single organ, systemic diseases involving multiple organs as well as acting as a response to many ailments that affect modern society.[5,6]

Marma Chikitsa works on the neuro-endocrine system which implies that specific chemicals and neurotransmitters, such as endorphins and enkephalin, are released in response to pressure or stimulation applied to the particular sites. This in turn conveys nerve impulses to the brain which alters the feeling of pain sensation. Another theory of Gate control mechanism explains the mode of action of *Marma* therapy in pain management.

Pain and Nociceptors

Pain is indispensable for survival. It serves a protective function by signaling the presence of noxious, tissue-damaging conditions. From a medical standpoint, the subjective description and indication of the location of pain may help pinpoint the underlying cause of the disease.(7)

The receptors for pain are free nerve ending which are present in all parts of body except mind. Intense thermal, mechanical, or chemical stimuli can activate the receptors. Irritation or damage at tissue or cellular level releases chemical compounds which consist of prostaglandins and potassium ions (k+) that stimulate nociceptors. Pain may also persist even after absence of stimulus, due to this fact ache-mediating chemical substances linger and due to this effect nociceptors show-off very small amount of adaptation. Conditions that elicit the ache include excessive distention (stretching) of a structure, prolonged muscular con-tractions, muscle spasms or ischemia (insufficient blood flow to an organ).(8)

Analgesic drugs are the mainstay of acute and chronic pain management. Despite their short-term effectiveness, significant concerns regarding drug dependence, addiction and other side effects have been raised. The misuse of analgesics has also garnered international attention. New insights into the mechanisms underlying pain sensitivity and recovery are gradually being reported. The development of new therapeutic modalities, drug delivery systems and nonpharmaceutical adjuvant therapies have potential value in pain management.[9]

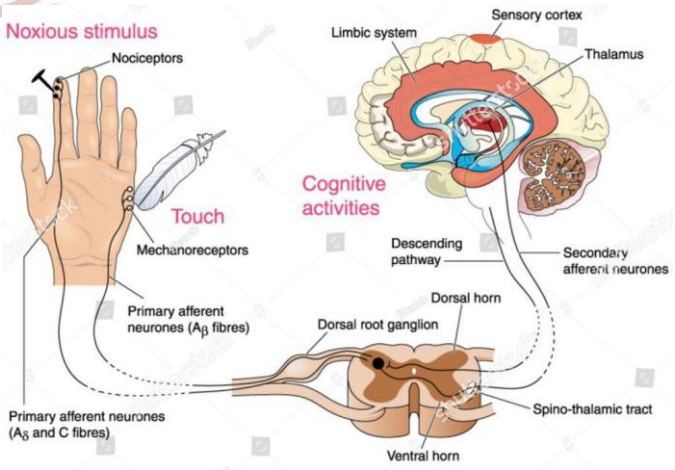
Neurologic aspects and pathways of pain

Ascending pathways rapidly bring information from the periphery to the brain. They identify a pain's nature and location, arouse central mechanisms, and activate the limbic system. Analgesic pathways, originating in the brain and descending in the spinal cord, modulate pain perception.

This neuroanatomy for pain and analgesia serves as the basis of many treatment strategies.[10]

It was long believed that there was a circuit in the central nervous system that could modify incoming pain signals. Two ideas for such a circuit are the gate control theory and ascending/descending pain transmission system.

The first pain modulatory mechanism called the "Gate Control theory" was proposed by Melzack and Wall in the mid 1960s. The concept of the gate control theory is that non-painful input closes the gates to painful input, which results in prevention of the pain sensation from traveling to the CNS (i.e., non-noxious input [stimulation] suppresses pain). The theory suggests that collaterals of the large sensory fibers carrying cutaneous sensory input activate inhibitory interneurons, which inhibit (modulate) pain transmission information carried by the pain fibers. Non-noxious input suppresses pain, or sensory input "closes the gate" to noxious input. The gate theory predicts that at the spinal cord level, non-noxious stimulation will produce presynaptic inhibition on dorsal root nociceptor fibers that synapse on nociceptors spinal neurons (T), and this presynaptic inhibition will block incoming noxious information from reaching the CNS (i.e., will close the gate to incoming noxious information).[11]



The concept behind the creation and application of Marma treatment for pain alleviation was supported by the gate control theory.

The modulation of this gate is carried out by two distinct types of nerve fibers, namely, unmyelinated C fibers with a small diameter and myelinated A fibers with a big diameter. Pain and other unpleasant feelings are transmitted by the C fibers, while Information concerning non-painful sensations like pressure and touch is transmitted by the A fibers.

An extensive network of neurons that are situated in the dorsal horn of the spinal cord is responsible for controlling the gate. When the C fibers undergo stimulation, they release substance P, a neurotransmitter that activates these neurons and opens the gate, allowing nociceptive information to be transmitted to the brain. However, When the A fibers are stimulated, they produce another neurotransmitter named glutamate, which activates a distinct set of neurons which close the gate, preventing nociceptive impulses from going through. Apart from these primary fibers, a number of additional elements can modulate the gate's opening and closing, such as descending pathways from the brainstem and higher centres in the brain, as well as additional information gathered from the body and surroundings.

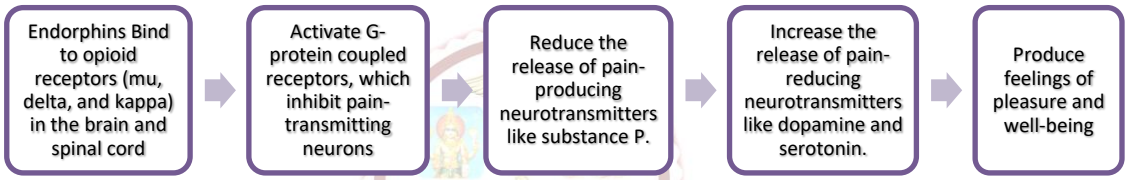
Marma therapy and Gate Control theory

The management of pain is significantly impacted by the gate control theory of pain. One of the important implications is that pain perception can be modulated by non-pharmacological interventions such as physical therapy, relaxation techniques and *Marma* therapy. *Marma* therapies can activate inhibitory pathways in the brain and spinal cord, hindering pain signal transmission and improving the spinal cord's gating mechanism. It functions by triggering the A fibers and closing the gate, which reduces the transmission of nociceptive signals to the brain.

Marma therapy and Endorphins– The Natural Painkillers

Endorphins are natural painkillers produced by the body. These are neurotransmitters released by the pituitary gland and hypothalamus in the brain. They work by binding to opioid receptors in the brain and spinal cord, which blocks the transmission of pain signals. Stress or pain stimuli activate the hypothalamus and pituitary gland. The pituitary gland releases endorphin-releasing hormones. Endorphins are released from the pituitary gland and other sources like the spinal cord, immune cells, and gastrointestinal tract.

Mechanism of action



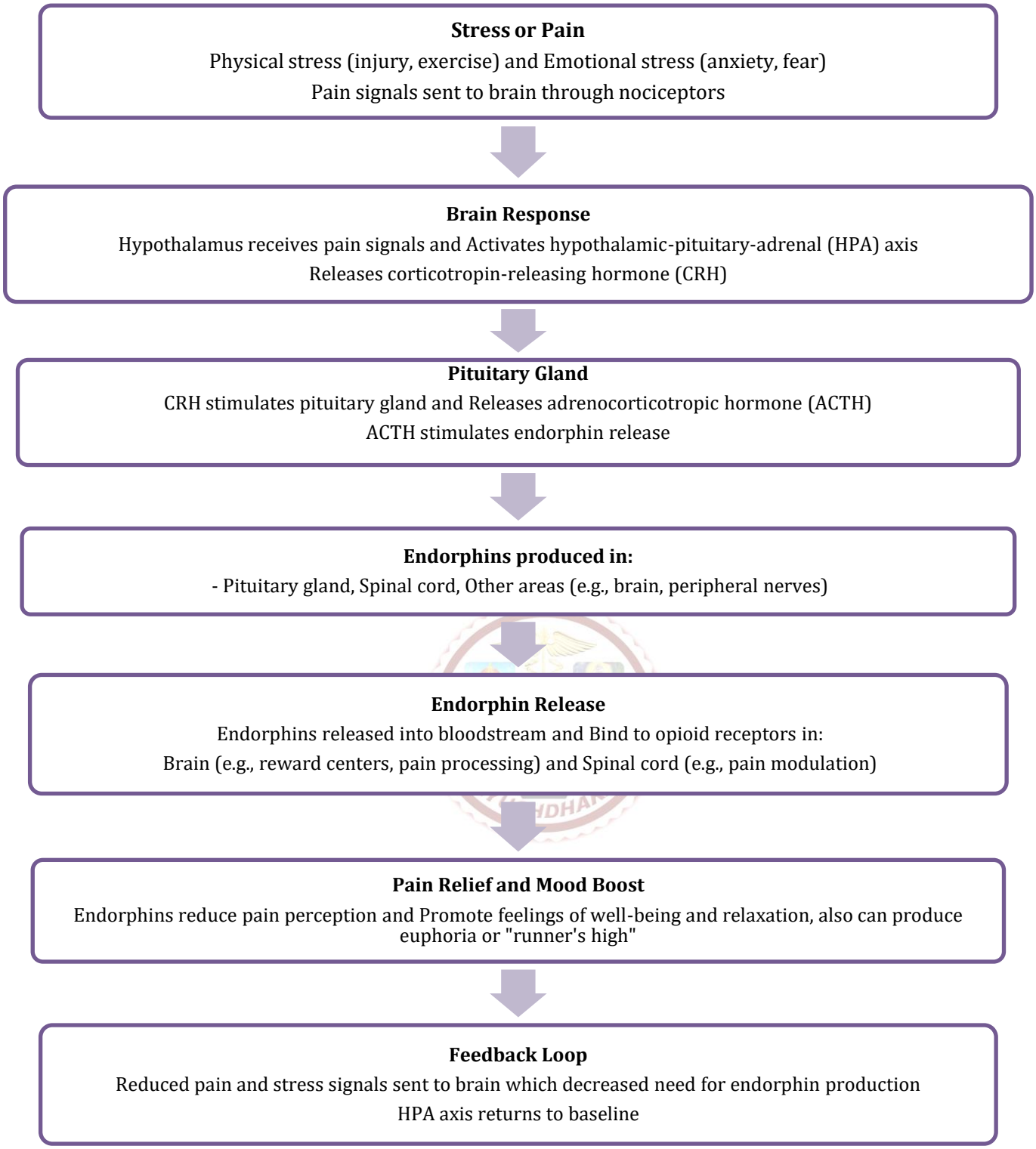
Therapist's touch activates pressure receptors in the skin and soft tissues. This sensory input sends signals to the brain, stimulating the release of endorphins.

Marma therapy has been used to stimulate the release of endorphins, the body's natural painkillers. The relation between *Marma* therapy and endorphin release can be understood by the following concept:

1. **Stimulation of *Marma* points:** Gentle pressure applied to specific *Marma* points can activate the nerves and stimulate the release of neurotransmitters.
2. **Activation of the pituitary gland:** Stimulation of certain *Marma* points (non-noxious stimuli) can activate the pituitary gland, leading to the release of endorphin-releasing hormones.
3. **Release of endorphins:** The pituitary gland releases endorphins, which bind to opioid receptors in the brain and spinal cord, producing analgesia and pain relief.
4. **Pain modulation:** *Marma* therapy can modulate pain perception by releasing endorphins, which can reduce pain intensity and duration.
5. **Relaxation response:** *Marma* therapy can induce a relaxation response, which can lead to reduced stress and increased endorphin release.
6. **Specific *Marma* points:** Certain *Marma* points, such as those on the head, neck, and lower back, are believed to be more effective in stimulating endorphin release.

Hypothalamic-Pituitary-Adrenal (HPA) Axis

The hypothalamic-pituitary-adrenal (HPA) axis is a communication system between three organs. It's crucial for body's stress management. These endocrine system organs create a feedback loop of hormones to enact and regulate your body's stress reaction. More specifically, the HPA axis is a neuroendocrine system. It consists of cells that release hormones into blood (via your endocrine system) in response to nervous system stimulation. Here is a flow chart of HPA axis and its mechanism of action.[12]



DISCUSSION

The ancient Indian medical system known as Ayurveda places an important priority on taking an integrated approach to one's health and well-being. *Marma* therapy, a fundamental principle of Ayurveda, involves manipulating certain energy points called "*Marmas*," to restore balance and encourage healing. These vital points are believed to govern the flow of life-force energy or *Prana*. By applying gentle pressure to these vital points, *Marma* therapy aims to release blockages, nourish tissues, and harmonize the body's energies. This ancient practice is used to prevent and treat various health conditions, including pain, inflammation, and stress-related disorders, and is often integrated with other Ayurvedic modalities, such as herbal medicine, yoga, and meditation, to promote overall well-being and self-healing. By accessing and balancing the body's subtle energies through *Marma* therapy, individuals can experience profound relaxation, rejuvenation, and spiritual growth.

Marma therapy has been shown to be effective in pain management through its connection with the Gate Control Theory and Neuromodulation Technique. By stimulating specific *Marma* points, the gate control mechanism is activated, reducing pain transmission and modulating pain perception. The Gate Control Theory proposes that certain nerve fibers, called nociceptors, transmit pain signals to the brain. However, other nerve fibers called non-nociceptors can inhibit or "gate out" these pain signals. *Marma* therapy stimulates specific points that activate non-nociceptors thereby reducing pain transmission.

Marma therapy activates neuromodulatory pathways, influencing the brain's pain processing centers and modulating pain perception. This gentle yet profound therapy can alter pain signaling, reducing the transmission of pain signals and promoting the release of natural pain-relievers, such as endorphins and neurotransmitters.

Marma therapy offers a natural and effective approach to pain management through the release of endorphins. By stimulating specific energy points or *Marmas*, *Marma* therapy activates the body's natural painkillers, endorphins, to reduce discomfort and promote relaxation. As endorphins bind to opioid receptors in the brain and spinal cord, pain transmission is inhibited, providing relief from chronic pain, inflammation, and stress-related disorders. Regular *Marma* therapy sessions can lead to sustained endorphin release, enhancing the body's natural pain-modulating mechanisms and reducing reliance on external pain medications. By harnessing the power of endorphins, *Marma* therapy provides a holistic and sustainable solution for managing pain, promoting overall well-being, and enhancing quality of life.

CONCLUSION

In conclusion, *Marma* therapy offers a profound healing touch for pain management, rooted in the principles of Gate Control Theory and Neuromodulation Technique. Through its gentle yet powerful approach, *Marma* therapy rewires the brain's pain response, leading to long-term pain reduction, improved mood, and enhanced overall well-being. As a holistic and sustainable solution, *Marma* therapy empowers individuals to reclaim control over their bodies and lives, offering a beacon of hope for those seeking relief from chronic pain. By integrating *Marma* therapy into conventional pain management approaches, we can unlock a new era of healthcare, one that honours the intricate web of body, mind, and spirit.

REFERENCES

1. Gupta KA. Ashtanga Hridyam of Vagbhata - Vidyotini Hindi commentary. Varanasi, Uttar Pradesh, India: Chaukhamba Sanskrit Sansthan; 2005.
2. Sushruta Samhita translated by Dr.Ambika datta Sastri, Published by Chaukhamba Sanskrit Samsthan, Varanasi, Part-I, Shareersthan 6/16, P.No–69
3. Frawley D, Ranade S, Lele A (2008), Ayurveda and Marma Therapy (1st edition), Chaukhamba Sanskrit Pratishthan, ISBN no. 81-7084-282-4, 96-111(5)
4. Nishteswar K. Science of Marma (in Ayurvedic diagnosis and treatment). Ayu. 2015 Jan-Mar; 36(1): 113–4. PMCID: PMC4687231.
5. Joshi S.K. Vani publication; Delhi: 2010. Marma science and principle of marma therapy; pp. 43–56.
6. Venkata Subramanian N. Complementary and alternative interventions for stroke recovery - a narrative overview of the published evidence. J Compl Integr Med. 2021; 18(3): 553–559. doi: 10.1515/jcim-2020-0062.
7. Tortora, Gerard J. Principal of Anatomy and Physiology. Hoboken, NJ: J Wiley. 2006, 13th edition, Page 612.
8. Tortora, Gerard J. Principal of Anatomy and Physiology, Hoboken, NJ: J Wiley. 2006, 13th edition, Page 613.
9. Cao B, Xu Q, Shi Y, Zhao R, Li H, Zheng J, Liu F, Wan Y, Wei B. Pathology of pain and its implications for therapeutic interventions. Signal Transduct Target Ther. 2024 Jun 8; 9(1): 155. doi: 10.1038/s41392-024-01845-w. PMID: 38851750; PMCID: PMC 11162504.
10. David Myland Kaufman, Howard L. Geyer, Mark J. Milstein, Jillian L. Rosengard, In Major Problems in Neurology, Kaufman's Clinical Neurology for Psychiatrists (Ninth Edition), Elsevier, 2023, Pages 325-343
11. Neuroscience online, an electronic textbook for neurosciences, Nachum Dafny, Ph.D., Department of Neurobiology and Anatomy, The UT Medical School at Houston, chapter 8 Pain Modulation and Mechanisms
12. https://my.clevelandclinic.org/health/body/hypothalamic-pituitary-adrenal-hpa-axis

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***Address for correspondence**
Dr. Chaudhari Pranali
Post Graduate Scholar,
Dept. of Rachna Sharir,
Pt. Khushilal Sharma Govt. Ayurveda College, Bhopal, Madhya Pradesh, India.
Email: panu2oct@gmail.com