

CADAVERIC STUDY OF MARMAS OF THE PALM AND SOLE WITH SPECIAL REFERENCE TO THE DERMATOMES OF SPINAL NERVES

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ABSTRACT

- **Background:** In Ayurvedic literature, Marmas are designated as vital anatomical points where five tissue elements (Mamsa, Sira, Snayu, Asthi, and Sandhi) meet and where Prana (life force) resides. Acharya Sushruta classified 107 Marmas, including 44 in the extremities (Shakhas). Among these, four Marmas are situated specifically in each palm and sole: Kshipra, Talahridaya, Kurcha, and Kurchashira.
- **Objective:** To establish an anatomical and neurodevelopmental correlation between the Shakhshrita Marmas of the palm (Hastatala) and sole (Padatala) with modern neuroanatomy, specifically focusing on dermatomal maps and peripheral nerve distributions.
- **Methods:** A combined methodology comprising literary analysis of classical Ayurvedic texts (Sushruta Samhita,

Charaka Samhita, Ashtanga Hridaya) and cadaveric dissection was conducted. Hand and foot dissections were performed to trace the underlying neurovascular structures and map them against C6–T1 and L4–S2 dermatomal zones.

- **Results:** Kshipra Marma maps directly to the first interdigital web spaces, innervated by the terminal digital branches of the median and radial nerves (C6–C7) in the hand, and the deep peroneal nerve (L5) in the foot. Talahridaya Marma lies over the superficial/deep

palmar arches and medial/lateral plantar nerves (C7–C8 and S1). Kurcha and Kurchashira Marmas align with the thenar/plantar intrinsic muscular complexes and retinacular nerve entrapment sites.

- **Conclusion:** The classical manifestations of Marma Abhighata (trauma) closely parallel acute radiculopathies, peripheral nerve entrapment, and compartment syndromes. Mapping Marmas to modern dermatomes provides a neuroanatomical rationale for Marma Chikitsa (acupressure/stimulation therapies) and regional surgical safety.

KEYWORDS: Marma Sharira, Kshipra Marma, Talahridaya Marma, Dermatomes, Cadaveric Dissection, Neuroanatomy, BAMS.

1. INTRODUCTION

Acharya Sushruta, considered the pioneer of ancient surgery, emphasized practical cadaveric dissection (Shodhana) to master surgical anatomy:

“One who intends to acquire definite knowledge of surgery should study anatomy ractically by dissecting the cadaver properly.” (S. Sharir 5/47)

Among the 107 vital points (Marmas) detailed in classical treatises, the distal extremity extremities—the palm (Hastatala) and sole (Padatala)—house four key Marmas per limb:

1. *Kshipra (Kalantara Pranahara / Snayu Marma)*
2. *Talahridaya (Kalantara Pranahara / Mamsa Marma)*
3. *Kurcha (Vaikalyakara / Snayu Marma)*
4. *Kurchashira (Rujakara / Snayu Marma)*

While classical texts document outcomes of injury (Viddha Lakshanas) ranging from severe pain (Ruja) to functional disability (Vikalata) and delayed mortality (Kalantara Pranahara), modern equivalents connect these sites to dense neurovascular bundles. This study maps these points through cadaveric dissection to demonstrate how spinal nerve dermatomes (C6–T1 for upper limbs; L4–S1 for lower limbs) correlate with ancient Marma Sharira.

2. MATERIALS AND METHODS

- **Literary Review:** Comprehensive analysis of classical texts (Rigveda, Sushruta Samhita, Charaka Samhita, Ashtanga Hridaya) alongside modern human anatomy literature.
- **Cadaveric Dissection:** Dissection of formalin-preserved human cadaveric hand and foot specimens.

- **Palmar Aspect:** Skin reflection, superficial palmar fascia, palmar aponeurosis, digital nerves, superficial/deep palmar arterial arches, flexor tendons, and intrinsic thenar/hypothenar muscles.
- **Plantar Aspect:** Skin reflection, plantar aponeurosis, flexor digitorum brevis, medial/lateral plantar nerves and arteries.
- **Dermatomal Mapping:** Cross-referencing anatomical landmarks with cutaneous sensory distributions originating from cervical (C6, C7, C8) and lumbosacral (L4, L5, S1) spinal nerve roots.

3. Observations and Neuroanatomical Correlation.

Marma Name	Structural Class	Prognostic Class	Angula Parimana	Anatomical Structures Involved	Corresponding Dermatome & Nerve Supply
Kshipra (Palm)	Snayu Marma	Kalantara Pranahara	0.5 Angula	1st dorsal interosseous muscle, adductor pollicis, superficial palmar branch of radial artery.	C6–C7 (Digital branches of Median & Radial nerves).
Kshipra (Sole)	Snayu Marma	Kalantara Pranahara	0.5 Angula	1st dorsal metatarsal artery, extensor hallucis longus tendon, deep peroneal nerve.	L5 (Terminal branches of Deep Peroneal nerve).
Talahridaya (Palm)	Mamsa Marma	Kalantara Pranahara	0.5 Angula	Palmar aponeurosis, superficial & deep palmar arches, flexor tendons, lumbricals.	C7–C8 (Palmar digital branches of Median & Ulnar nerves).
Talahridaya (Sole)	Mamsa Marma	Kalantara Pranahara	0.5 Angula	Plantar aponeurosis, flexor digitorum brevis, medial & lateral plantar neurovascular bundles.	S1 (Medial & Lateral Plantar nerves).
Kurcha (Palm)	Snayu Marma	Vaikalyakara	Swa-Panitala	Thenar musculature (Abductor, Flexor, Opponens pollicis), recurrent branch of median	C6–C7 (Recurrent motor branch of Median nerve).

				nerve.	
Kurcha (Sole)	Snayu Marma	Vaikalyakara	Swa-Panitala	Long plantar tendons, abductor hallucis muscle, medial plantar nerve branches.	L5–S1 (Medial Plantar nerve).
Kurchashira (Palm)	Snayu Marma	Rujakara	1 Angula	Distal border of flexor retinaculum, base of thenar eminence, carpal tunnel outlet.	C6–C7 (Median nerve at carpal tunnel exit).
Kurchashira (Sole)	Snayu Marma	Rujakara	1 Angula	Inferior extensor retinaculum, calcaneonavicular (spring) ligament, deep peroneal nerve.	L4–L5 (Deep & Superficial Peroneal nerves).

4. DISCUSSION

A. Pathophysiological Interpretation of Injury (Viddha Lakshanas)

1. Kshipra Marma: Injury to Kshipra is described as causing Akshepaka (convulsions/spasms) and rapid functional demise. Anatomically, severe trauma or hemorrhage in the first interdigital space triggers intense neurogenic pain along the C6/C7 or L5 spinal segments, causing motor spasms and loss of thumb/toe opposition.
2. Talahridaya Marma: Described as causing severe pain (Ruja) leading to death. Deep penetrating trauma to the central palm or sole injures the palmar or plantar arterial arches and major nerve trunks, leading to severe compartment syndromes, rapid blood loss, or septic shock.
3. Kurcha and Kurchashira Marmas: Injury leads to Bhramana/Vepana (tremors/instability) and severe persistent pain (Ruja). Correlative dissection shows these regions oversee motor control of intrinsic thenar and plantar muscles. Damage to the recurrent median nerve branch or carpal/tarsal tunnel regions produces thumb atrophy, loss of gripping capacity, and chronic neuropathic pain mimicking Carpal/Tarsal Tunnel Syndrome.

B. Clinical and Diagnostic Significance

- Radiculopathy Localization: Modern neurological testing relies on non-overlapping dermatomal zones in distal extremities. Numbness in the lateral palm or medial sole directly isolates C6 or L5 nerve root lesions, validating the diagnostic precision of extremity Marmas.

- Therapeutic Application (Marma Chikitsa): Palmoplantar surfaces contain dense mechanoreceptors. Controlled stimulation (via pressure or Abhyanga) sends rapid sensory afferent signals to corresponding spinal cord segments, modulating autonomic reflex arcs and relieving pain.

5. CONCLUSION

The classical Ayurvedic concept of Marma Sharira reflects a functional and regional anatomical understanding. The Marmas of the palm and sole—Kshipra, Talahridaya, Kurcha, and Kurchashira—correlate directly with major neurovascular hubs and localized dermatomal boundaries (C6–C8 and L4–S1). This integrative study validates classical descriptions of Marma trauma and offers an evidence-based foundation for therapeutic Marma Chikitsa and surgical risk mitigation.

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