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Cadaveric Study on *Kurcha Sharir* along with its modern perspectives

Review Article

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Abstract

In *Ayurveda*, *Rachana Sharir* examines the embryological and structural organization of the human body. One of the branches of *Rachana Sharir* that describes a certain body structure is *Paribhasha Sharir.* Literally, *Paribhasha* signifies terminology. The first step in understanding any given subject is to grasp its basic terminology and main concepts. *Kurcha* is among such unexplored topics that come from the *sannipat* of *dhamani* and *snayu. Kurcha* is examined in this study from the perspective of modern anatomy, contrasting its location and related elements with knowledge from both Ayurvedic and Modern medical literature. The purpose of the cadaveric dissection method is to investigate the anatomical structures related to the *kurcha* and to evaluate the applicability of traditional *Ayurvedic* concepts, such as those described by *Sushruta*, in the context of modern medical understanding.

Keywords: *Paribhasa Sharir, Kurcha,* Palmar aponeurosis, Plantar aponeurosis, Ligamentum nuchae, Suspensory ligament of penis.

Introduction

Ayurveda, a well-known Indian system of medicine, is more than just a life science; it is a rich source of knowledge. Despite being ancient, its principles are still relevant today. The branch of *Ayurveda* called *Sharir* also reflects this enduring relevance. *Sushruta*, known as the father of surgery, made significant contributions in his famous work, the *Sushruta Samhita*. The *Sharirsthana* section of this text is particularly important for its detailed explanation of human anatomy. Understanding anatomy is crucial for maintaining the body's health, as this knowledge provides the foundation for effective treatment. A knowledgeable physician seeks a deep understanding of anatomy, which involves studying the different parts of the body.

Haranchandra in his commentary states that *Kurchas* are derived from the *Sannipat* of *Snayu* and *Dhamani* . *Sannipat* here means intersection. Their total number is 6. These are fibrous or membranous brush like structures.

षट् कूर्चाः, ते हस्तपादग्रीवामेढ्रेषु; हस्तयोर्द्वौ, पादयोर्द्वौ, ग्रीवामेढ्रयोरेकैकः ॥१३॥ (4)
षट् कूर्चा इत्यादि|
कूर्चा इव कूर्चाः, नाम्नैवाकृतिरुन्नेया; ते पुनर्मांसास्थिसिरास्नायूनां जालकप्रभवाणां ।१।
सन्ततिविरचिताः (*Dalhana)*

In the context of "*Kurcha,*" the important terminologies are explored with regard to their *Vyutpatti* (word formation), *Nirukti* (etymology), and their equivalents in modern scientific terminology. There are three main references about *Kurchasharir* in ancient texts: *Sushruta Samhita (Shareersthana*) (1), *Ashtang Samgrah* (2), and *Bhavaprakasha Prathamkhanda* (3). These texts suggest that there are six *Kurchas* in the human body, located in the hands (*Hasta*), feet (*Pada*), neck (*Greeva*), and genitals (*Medhra*). Specifically, there are two *Kurchas* in each hand and foot, and one each in the neck and genitals (4).

In the *Sushruta Samhita*, it is referred to as "*Kunchika*," meaning a brush-like structure or "*Kunchala*." (5) In the *Ashtang Hridaya, "Kurcha*" is used to mean "*suchi*" (needle), indicating a sharp-ended needle (6). In various dictionaries, the term "*Kurcha*" has multiple meanings, such as a bunch or bundle of anything, a handful of *Kusa* grass, or a peacock's feather (7). According to *Acharya Charaka*, in *Chikitsasthana*, uses the term "*Shastra*" for "*Kurcha*.". An important reference in the *Sushruta Samhita* notes that there are six *Kurchas* in the human body, all with brush-like structures.

Materials and Methods

This article will gather information from primary *Ayurvedic* texts knows as *Samhitas* , as well as modern anatomy books, national and international journals, various databases.

Cadaveric study

Methodology

1. The anatomical analysis of *Kurcha is done* through studying relevant *Ayurvedic* and modern textbooks.
2. Dissection of a selected male cadaver was conducted using a dissection kit over the region considered specific to the *Kurchas* at the dissection hall of the

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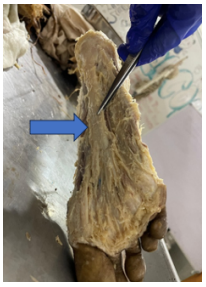
3. The identification of the *Kurchas* on the cadaver was based on findings from the literary study.
4. The area around the *Kurchas* was marked according to proportions specified in the *Samhitas*.
5. Detailed dissection focused on specific anatomical landmarks.
6. Through precise dissection, structures related to the *Kurchas*, including Palmar Aponeurosis, Plantar Aponeurosis, Ligamentum Nuchae & Suspensory ligament of the Penis are identified.

Fig 1: Plantar Aponeurosis	Fig 2: Ligamentum Nuchae	Fig: 3 : Suspensory Ligament of Penis
		

Structure associated with "*Kurcha*" in the hand refers to specific anatomical formations or features present within the hand

The palmar aponeurosis

This well-defined, strong triangular section of the deep fascia in the hand, known as the palmar aponeurosis, covers the soft tissues and lies over the long flexor tendons of the palm. The proximal end of the aponeurosis is continuous with the flexor retinaculum and the tendon of the palmaris longus muscle. At the base of the fingers, the distal end of the aponeurosis splits into four longitudinal bands. Each band attaches to the base of the proximal phalanx and merges with the fibrous digital sheath (8).

Applied Anatomical Aspects

Dupuytren's contracture is a progressive disorder of unclear origin that involves the fibrous thickening and contraction of the palmar aponeurosis, predominantly affecting the little and ring fingers.

Structure associated with "*Kurcha*" in the foot refers to specific anatomical formations or features found within the foot

The plantar aponeurosis

The central portion of the plantar fascia thickens significantly to form the plantar aponeurosis. This structure has a strong, thick central section, along with thinner, weaker medial and lateral portions. Covering the entire sole of the foot, the plantar aponeurosis is composed of dense fibrous connective tissue arranged in longitudinal bands. It originates at the tuber calcanei (heel bone) and spreads out over the sole, becoming broader and slightly thinner. The aponeurosis then divides into five bands that split to surround the digital tendons and attach to the edges of the fibrous digital sheaths and the sesamoid bones of the big toe. From the edges of the central part of the plantar aponeurosis, vertical septa extend deeply into the sole to create three compartments: the medial, lateral, and central compartments of the foot (9)

Applied Anatomical Aspects

Palpating the dorsalis pedis pulse is crucial, especially when diagnosing intermittent claudication, which is characterized by calf cramps induced by exercise and relieved by rest. This pulse is typically felt on the top of the foot, where the artery runs over the navicular and cuneiform bones, just beside the extensor hallucis longus tendon. It can also be detected near the base of the first interosseous space. A weak or absent dorsalis pedis pulse may indicate arterial insufficiency. However, in about 14% of individuals, the dorsalis pedis artery may be absent, too small to palpate, or located differently than usual. Therefore, not finding this pulse does not always confirm the presence of arteriosclerotic disease.

Structure Associated with *Kurcha* in the Neck

Ligamentum nuchae

The ligamentum nuchae is a bilaminar fibroelastic intermuscular septum that, while similar to the supraspinous and interspinous ligaments in the neck, has distinct structural features. Its dense fibroelastic layers merge along the posterior free border, which is superficial and extends from the external occipital protuberance to the spine of C7. These fibroelastic layers attach to the external occipital crest, the posterior tubercle of C1, and the medial aspects of the bifid spines of cervical vertebrae, serving as a septum for the attachment of cervical muscles and their sheaths. Additionally, it has a midline connection to the posterior spinal dura at the atlanto-occipital and atlanto-axial levels. In bipeds, the ligamentum nuchae is a reduced version of a more complex, thicker elastic ligament found in quadrupeds, where it helps support the head and manage its flexion (10).

Applied Anatomical Aspects

The ligamentum nuchae is a well-developed part of the supraspinous ligament located in the cervical region. It extends from the external occipital protuberance along the tips of the cervical vertebrae's spinous processes, ending at the spinous process of the vertebra prominens, usually at C7. The supraspinous ligament can be seen as a superficial extension of the interspinous ligament, which runs between adjacent vertebrae from the base to the tip of each spinous process. The ligamentum nuchae is mainly formed from the aponeurotic connections of the surrounding and underlying muscles. From superficial to deep, the muscles associated with the ligamentum nuchae are the trapezius, rhomboideus minor, splenius capitis, and serratus posterior superior. There are fibrous connections between the ligamentum nuchae and the spinal dura mater between the occiput and C1, as well as between C1 and C2. Additional attachments were

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found between the ligamentum flavum and the spinal dura between C2 and C3, although these connections were less pronounced than those at higher levels. Contrary to previous reports, no direct attachments were found between the spinal dura and the rectus capitis posterior minor (RCPM). This thin membrane extends from the posterior edge of the foramen magnum to the upper border of the posterior arch of C1. Interestingly, while most of the cranial dura is innervated by the trigeminal nerve (CN V), the infratentorial portion—below the cerebellar tentorium—is innervated by upper cervical nerves. The cranial dura mater consists of two layers: the outer, or endosteal layer, and the inner, or meningeal layer. These layers remain in contact throughout most of the cranial cavity, except where they separate to form the dural sinuses. The outer layer ends at its attachment around the foramen magnum, while the inner layer continues through the foramen magnum to become the spinal dura mater. The periosteum of the vertebral canal is equivalent to the outer layer of the cranial dura mater. In summary, several cervical structures are connected to the cranial dura through their attachments to the spinal dura. The ligamentum nuchae has a direct attachment to the spinal dura, and the ligamentum flavum also attaches, but to a lesser extent. The sensory innervation of both the cervical spinal dura and the cranial dura in the posterior cranial fossa is provided by the upper cervical nerves. These nerves also supply sensation to the deep muscles of the back and the skin overlying the back. While the trapezius muscle is innervated by the accessory nerve, its sensory innervation comes from the upper cervical nerves. Therefore, a therapist working on a client's neck could find the effort worthwhile, given the interconnectedness of these structures.

Structure associated with *Kurcha* in the pubic region

Suspensory ligaments of penis

The body of the penis is supported by two ligaments, the fundiform ligament and the triangular suspensory ligament, both of which are continuous with its fascia and primarily composed of elastin fibers. The fundiform ligament originates from the lower part of the linea alba, splits into two layers that encircle the penis, and then merge below with the scrotal septum. The triangular suspensory ligament, located deeper than the fundiform ligament, attaches to the front of the pubic symphysis and blends with the fascia of the penis on each side. Unlike structures in the hand and foot regions, these ligaments do not resemble a brush-like form. However, Sushruta, using his ancient dissection techniques, might have observed these structures appearing like "*Kunchi*" and referred to them as "*Kurchas*." The ancient methods of dissection were distinct, and the instruments used were different from those used today. Additionally, in the penile region (*Medhra Pradesha*), the presence of "*Dhamani Sannipata*" is mentioned, which could correspond to the arterial structures in the penile region that resemble a brush-like pattern (11).

Applied Anatomy Aspects

In males, the suspensory ligament of the penis is attached to the pubic symphysis, which holds the penis close to the pubic bone and supports it when erect. Surgically cutting this ligament allows more of the penis to hang outside the body, thereby increasing its length. The ligament is then encouraged to heal in an extended state, promoting a longer penis overall. Until this ligament is properly healed, the penis cannot achieve a high angle of erection when engorged. At the base of the body of the penis, identify the fundiform ligament of the penis. This ligament is derived from the membranous Scarpa's fascia of the anterior abdominal wall. The fundiform ligament of the penis extends from the linea Alba to the penis and surrounds it laterally and it ends in the scrotal septum. The fundiform ligament supports the penis in a sling-like fashion. Deep to the fundiform ligament - identify the suspensory ligament of the penis. This short, strong ligament that arises from the anterior surface of the pubic symphysis attaches to the deep fascia (Buck's fascia) of the penis.

Discussion

According to Ayurvedic literature, the study of the human cadaver serves two primary purposes:

1. **Sharir Vichaya** – Dissection of the body.
2. **Sharir Shodhana** – Exploration or examination of the body.

These practices are to be carried out with the intent of "*Sharir Upakarartha*," meaning for the benefit of the body. The term "*Kurcha,*" mentioned in *Sushruta's Sharir Sthana*, has been examined and elaborated upon. This concept falls under the category of *Sandigdha* (ambiguous) and *Upaman Sharir* (comparative anatomy).

In relation to *Kurcha Sharira*, there are three key commentaries, with notable contributions from *Dalhana, Haranachandra*, and *Indu*. Focusing on *Dalhana's* commentary, he describes six *Kurchas*, which have a brush-like appearance, as the term "*Kurcha"* itself suggests. According to *Dalhana,* these structures are formed by the union of muscles (*Mamsa*), bones (*Asthi*), blood vessels (*Sira*), and ligaments (*Snayu*). They resemble a reticular network (*Jalaka*) and extend from the forearm and leg into the hand and foot. This interconnected network creates a brush-like appearance in the hand and foot, leading *Dalhana* to refer to it as *Kurcha*.

In modern anatomy, it is noted that the *Palmaris longus* muscle evolves phylogenetically into the palmar aponeurosis. The concept of *Kurcha*, as explained by *Sushruta*, has been discussed in the earlier review of literature.

Haranachandra describes *Kurchas* as brush-like structures formed by the union of ligaments, specifically referring to fibrous or aponeurotic tissues. He identifies five such fibrous or aponeurotic structures: one in the neck (*Greeva*), two in the armpits (*Kaksha*), and two in the groin (*Vankshana*). Here, *Kaksha* and *Vankshana* can be interpreted as referring to the hand and foot. All three commentaries relate *Kurcha Sharira*

to the palmar and plantar aponeurotic (or fibrotic) structures in the hands and feet.

Conclusion

Kurchas resemble "*Kunchi*," or brush-like structures, and are six in number. They are located as follows: two in the hands, two in the feet, one in the neck (*Greeva*), and one in the genital region (*Medhra*). The *Kurchas* in the hands and feet are fibrous or aponeurotic structures found on the palmar and plantar surfaces.

In Hasta (hands) and Pada (Feet)– 2 each and in Griva (neck) and Medhra (penis) there is 1 Kurcha each. Following brush like structures in body can be compared with Kurchas.

1. In Hasta (hands)– Palmar aponeurosis
2. In Pada (feet)– Plantar aponeurosis
3. In Griva (neck)– Nuchal ligament
4. In Medhra (penis)– Suspensory ligament of penis

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