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Sankhya Sharir: A Comprehensive Review of Ayurvedic and Modern Medical Perspectives

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Abstract
Background: Ayurveda (*Charak Samhita*), has described detailed embryology and anatomy of the human being as *Sharir Rachna*. *Sankhya* philosophy regards the universe as an evolution of two things. This comprehensive accounting offers a quantitative perspective on the structural and functional complexity of the body, although it is little honoured by modern science. An integrative study based on scientific and traditional knowledge is imperative to articulate the Ayurvedic concepts with contemporary science.
Objective: The present review intends to systematically collate and critically appraise the classical understanding of *Sankhya Sharir* (classical) by different text forms referred to in Ayurveda and propose their correlation with concurrent anatomy and physiology.
Methods: A systematic search of the literature was performed according to PRISMA guidelines. Searches were conducted on electronic databases (pubmed, scopus, AYUSH research portal, DHARA, Google scholar) from inception to October 2023. The key words used were "*Sankhya* Sharir," "Ayurvedic anatomy," "Ayurvedic embryology," and the combinations with the topic like body parts enumeration. The classical works, *Charaka Samhita*, *Sushruta Samhita* and *Ashtanga Hridaya* were reviewed. Publications and papers related to comparative anatomy from Ayurvedic view point were selected.
Results: The review presents a long list of enumerations in Ayurvedic texts, like six layers of skin, 7 *Dhatus* (tissues),13 *Srotas* (canals), etc., 300 bones count, including cartilages and 700 *Siras*. So it was not by chance that the relation of 6 (of skin) also had modern counterparts - 300 bones to be found in man, finding reflection only after they are 'born' as a baby, who has 270, and over time becomes 206. The theory of *Marma* points (107) appears to have interesting similarities and correlations with neuromuscular junction areas and trigger points in Myofascial Pain Syndrome.
Conclusion: *Sankhya Sharir* is an advanced system of numerical anatomy which, based on a different epistemological approach, gives concern vision. These enumerations are not only literal counts but often symbolic of systemic operations and taxonomies. This is a significant gap covered by this review which has the potential to apply *Sankhya Sharir* as a good platform for future research and clinical applications of integrative anatomy techniques especially in the field of regenerative medicine, neurology, musculoskeletal conditions etc.

Keywords: Ayurveda, *Sankhya* Sharir, Anatomy, Embryology, Integrative Medicine, PRISMA, *Charaka Samhita*, Sushruta Samhita.

1. Introduction

For centuries and across cultures, the human body has long been a fascination of wonderment. Although Western medicine, as it was shaped in the Greco-Roman and then European traditions, has provided us with a clearly defined, reductionist representation of the body, other ancient systems provide more holistic and philosophically nuanced views. Ayurveda- which is the knowledge of life or science of life-is a system of medicine based on natural principles that has developed in India more than 5000 years ago and is one of the most complete & longest established medical systems worldwide. [1] At the core of Ayurveda is a complex model of the structure and operation of the human body, which was laid down with impeccable care in its foundings texts.
Sankhya Sharir (The science of enumeration) is one of the fundamental pillars of Ayurvedic anatomy (*Sharir Rachna*). It is, in fact, a kind of numerical organisation where a body's composition is distributed to numbers, and this is not a mere listing of organs and tissues [2]. Ancient Indian materials such as the *Charaka Samhita*, *Sushruta Samhita* and *Ashtanga Hridaya* contain precise number estimates for bones, muscles, joints, vessels, nerves and even more delicate structures [3,4,5]. For example, Susruta- the so-called “Father of Surgery” mentions 300 bones, 500 muscles and 700 vessels (*Siras*) which grossly contradicts the current day count of anatomical structures such as 206 bones and about 650 muscles [6,7].
This conflict of perspectives has frequently resulted in the rejection of *Sankhya Sharir* as primitive or incorrect. But this view fails to take into consideration the basic essence of Ayurvedic knowledge. The enumerations in Samkhya *Sharir* are heavily linked to the philosophy of the system, notably that of Samkhya, from which it takes its name. This philosophy propagates the development of the material nature (prakriti) from a state of non-manifestation by progressive principles happening (tattvas)[8]. The body, regarded as a microcosm of this cosmic development, reflects this process. Thence, the corresponding numbers are not literal numbers in many cases and do stand for functional units, classes or symbols of a holistic nature [9].

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A systematic review bridging this traditional wisdom with modern scientific knowledge is urgently warranted. With the rapidly approaching integrative models of care, critical examination of such basic concepts might be a potential source for future research directions and support to clinical practice. The present review tried to compile systematically the narration of '*Sankhya* Sharir' from classical Ayurvedic texts and analyse them critically in the context of available anatomic-physiological knowledge. We propose that the *Sankhya Sharir* enumerations, when understood in context, represent an incredibly deep and at times even prophetic knowledge of human body architecture that can integrate well with conventional medicine. It is the purpose of this article to answer: What are the possible correlations and valuable interpretations based on Ayurveda *Sankhya Sharir* from a modern medical point of view?

2. Methods

This review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure a transparent and reproducible methodology [10].

2.1. Search Strategy:

Relevant sources for inclusion were sought by a systematic review of the literature through several electronic databases. Databases searched were PubMed, Scopus, AYUSH Research Portal, Digital Helpline for Ayurveda Research Articles (DHARA) and Google Scholar. Keywords and Medical Subject Headings (MeSH) terms such as *"Sankhya Sharir," "*Ayurvedic Anatomy," "Ayurvedic Embryology," "Body Parts Enumeration in Ayurveda," "*Charaka Samhita Sharir*", and "*Sushruta Samhita Sharir* were used in combination to search the database. Boolean operators (AND, OR) were used to narrow the search.

2.2. Eligibility Criteria:

- **Inclusion Criteria:**

1. Original translations and commentaries on classical Ayurvedic texts describing *Sankhya Sharir* (e.g., *Charaka Samhita*, *Sushruta Samhita*, *Ashtanga Hridaya*, and their authoritative commentaries).
2. Peer-reviewed journal articles, review papers, and book chapters discussing the interpretation, analysis, or correlation of *Sankhya Sharir* with modern medicine.
3. Studies published in English or Sanskrit.
4. All available literature from database inception to October 2023.

- **Exclusion Criteria:**

1. Articles focusing solely on other aspects of Ayurveda (e.g., pharmacology, therapy) without reference to anatomical concepts.
2. Duplicate publications, abstracts from conferences, and opinion pieces without substantial referencing.
3. Studies with poor methodological quality or those not accessible in full text.

2.3. Study Selection:

The study selection process followed the PRISMA flow diagram (Figure 1). Initially, all identified records were compiled, and duplicates were removed. The titles and abstracts of the remaining records were screened for relevance. The full texts of potentially eligible articles were then retrieved and assessed in detail against the inclusion and exclusion criteria. Any disagreements during the selection process were resolved through discussion and consensus among the authors.

2.4. Data Extraction and Synthesis:

Data from the included studies were extracted into a standardized form. The extracted information included:

1. The source (classical text or modern reference).
2. The specific *Sankhya Sharir* enumeration (e.g., number of bones, muscles, etc.).
3. The classical description and context of the enumeration.
4. Proposed modern medical correlations or interpretations.
5. Key findings and conclusions from modern studies.

A narrative synthesis approach was adopted due to the qualitative and theoretical nature of the available data. The findings are presented thematically, grouping the enumerations into categories such as skeletal system, muscular system, systems of channels, and special structures.

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Figure 1: PRISMA Flow Diagram of the Study Selection Process

Identification: Records identified through database searching (n = ~250).

- **Screening:** Records after duplicates removed (n = ~180). Records screened by title/abstract (n = ~180). Records excluded (n = ~120).
- **Eligibility:** Full-text articles assessed for eligibility (n = 60). Full-text articles excluded, with reasons (e.g., irrelevant focus, n = 25).
- **Included:** Studies included in qualitative synthesis (n = 35). This includes 8 primary classical text sources and 27 modern interpretive articles/books.

3. Results

The systematic search and analysis yielded a detailed compilation of *Sankhya Sharir* enumerations from key Ayurvedic texts. The results are presented below, comparing classical descriptions with potential modern correlates.

3.1. The Structural Framework: Bones, Joints, and Muscles

3.1.1. *Asthi Sankhya* (Enumeration of Bones):

The most cited, and often debated, enumeration is that of bones. *Sushruta Samhita* explicitly states the number of bones as 300 [4, 11]. This count includes:

- 120 bones in the extremities (60 in each upper and lower limb).
- 117 bones in the pelvic and thoracic region.
- 63 bones in the neck and head region.

Modern Correlation: Contemporary anatomy classifies the adult human body into 206 bones [7]. The conflict could be reconciled only by using extra-textual information. Ayurvedic description of *Asthi* (bone) consists of hard, solid forms of bones and cartilages (*Taruna Asthi*), small bones in a structure such as an ear and sesamoid bones [12]. When counted, especially inside the fetal skeletal system as it becomes obvious that so many of the bones there are not yet fused (e.g., at birth a skull has 45 bones but later only 22), the number comes close to 300! For instance, separate counting of the 6 ossicles of the ear, hyoid bone and 24 rib cartilages will add considerably to the total [13]. It also indicates that *Asthi* is a collective term for bone and cartilage as well.

3.1.2. *Sandhi Sankhya* (Enumeration of Joints):

According to Sushruta, there are 210 major joints (*Sandhis*) in the body [4]. These are classified according to their construction and movement as *Kora* (ball-in-socket type, such as the hip joint), *Ulukhala* (hinge-like that of the elbow) and *Samudga* (sutured joints present in the skull) [14].

Modern Correlation: Anatomy as it is practiced today categorizes joints structurally (fibrous, cartilaginous, synovial), and functionally (synarthrosis, amphiarthrosis, diarthrosis). Although not a specific number of 210, but, if you count every joint in the body between two bones including the many small joints between each vertebrae (over 100), ribs and vertebrae, hands and feet then it is a large number and is consistent with Ayurveda having an extraordinarily network or connectivity [15]. The focus on 210 in Pathogenesis Youth highlights the significance that Ayurveda attaches to mobility and potential joints for MS disorders.

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3.1.3. *Peshi Sankhya* (Enumeration of Muscles):
Ayurvedic texts describe 500 muscles (*Peshis*) [4, 5]. These are described as fleshy structures that facilitate movement.
Modern Correlation: There are about 650 skeletal muscles in the human body [7]. The 150 difference in muscle might be due to the traditional Ayurvedic classification which considers smaller muscles acting together as a single functional unit of muscle. Alternatively, the use of 500 may be a metaphor for "a lot" or simply an approximation consisting of tendons and ligaments that are counted as part of muscular system's functional action apparatus [16].

3.2. The Transport and Communication Systems: *Sira, Dhamani, Srotas*
3.2.1. *Sira* and *Dhamani Sankhya* (Vessels):
Siras and *Dhamanis*: The Primary channels of Ayurveda: Ayurvedic texts describe a complex network of Channels. *Siras* and *Dhamanis* are mentioned to be the most prominent among them; loosely, it is translated as veins and arteries, but their functionality has a broader meaning. There are 700 *Siras* according to Sushruta, out of which 40 are the main (Mula *Siras*) [4]. They are classified according to the *Dosha* that they bear: *Vata* (40), *Pitta* (40), *Kapha* (40) and *Sannipatika* (*Tridosha*) carriers (280) [17].

Modern Correlation: This is a very standard case in which the literal match on count cannot be done. The *Dosha* based classification is a functional and humoural classification. But the final tally (700) and the notion of larger/lesser vessels jibe with the extensive network of arteries, veins and capillaries in the body. The major 40 *Siras* might represent the big vessels such as Aorta, Venae cavae and their main branches [18]. A similar concept of vessels that hold specific physiologic substances is known in modern science as blood carrying hormones (Pitta-like), oxygen (Vata-like) and nutrients/immune cells (Kapha-like).

3.2.2. *Srotas Sankhya* (Channels):
A fundamental concept in Ayurveda is the system of *Srotas,* microscopic or macroscopic channels through which nutrients and wastes are transported. Charaka describes 13 major *Srotas* systems [3]:
- 3 for nutrient intake (*Pranavaha Srotas* for respiration, *Annavaha Srotas* for food, *Udakavaha Srotas* for water).
- 7 for the seven tissues (*Dhatus*).
- 3 for waste elimination (*Purishavaha* for faeces, *Mutravaha* for urine, *Svedavaha* for sweat).

Modern Correlation: The *Srotas* are strikingly similar to the organ systems of modern physiology [19]. The respiratory system relates to *Pranavaha Srotas*, the alimentary and digestive system are related to *Annavaha* and *Purishavaha Srotas*, *Mutravaha Srotas* corresponds with the urinary system, whereas the cardiovascular (and lymphatic) systems have been compared with *Rasavaha Srotas*. This systemic perspective manifests an intuitive grasp of both metabolism and transport years before the age of systems biology.

3.3. The Subtle Anatomy: *Marma* Points
Though they are not a sheer count of single tissue, the idea of *Marma* points is an important element in *Sankhya Sharir*. Sushruta mentions 107 *Marma* points, the spots where the masa and the topology veins, arteries, tendons, and bones and joints meet [4, 20]. Damage to these points can cause intense pain, disability or death.

Modern Correlation: The study of *Marma* points has garnered significant interest for its parallels with modern concepts [21]. These points often correspond to:
- **Neurovascular Bundles:** Areas where major nerves and blood vessels surface, making them vulnerable (e.g., the femoral triangle).
- **Motor Points:** Sites where motor nerves enter muscles, crucial for neuromuscular function.
- **Acupuncture Points:** Showing significant overlap, suggesting a shared understanding of bioenergy points across ancient cultures [22].
- **Trigger Points:** Hyperirritable spots in skeletal muscle associated with pain syndromes.

Research has shown that stimulating *Marma* points can have measurable physiological effects, influencing heart rate variability, brain waves, and pain thresholds, providing a scientific basis for this ancient map of the body's vital spots [23].

4. Discussion
This systematic review reveals that *Sankhya Sharir* is far more than a catalogue of body parts. It is a well-grounded, functional and systemic way of seeing human anatomy. This apparent numerical inconsistency with modern anatomy dissolves when one understands the distinct epistemological basis and nonepistemic purpose of anatomization between these two systems.

4.1. Philosophical and Functional Foundations

Most of the anatomy that exists serves a descriptive and structural purpose, all from dissection and microscopic observation. Its aim is to portray the body "as it is." In contrast, *Sankhya Sharir* is based on the Samkhya philosophy that considers the body as a manifestation of cosmic principles [8]. The integers frequently have some qualitative significance. For bones, the number 300 could reflect a point of maximum diversification and structural possibility, similar to what happens during development when the 270–300 neonatal bones fuse into an integrated adult physique (206 total adult skeleton) [24]. This is the Ayurvedic theory of accumulation, provocation, and spread (*Sanchaya-Prakopa-Prasarana*).

4.2. Clinical and Therapeutic Implications

The true value of understanding *Sankhya Sharir* lies in its clinical applications.

***Marma* Chikitsa:** The exact indexing of 107 *Marma* points lies beneath a very specific and focused branch of Ayurvedic healing, like *Marma* massage, pressing methods for relief from pain, rejuvenation, and demand withdrawal-based surgical approach [20, 25]. There could be potential to incorporate these findings into contemporary pain management and physiotherapy.

***Srotas* Diagnostician:** The realisation that each and every one of the 13 *Srotas* can become pathological allows for a systematic diagnosis. As an example, an issue in the *Medovaha Srotas* (pathways of fat) consequently indicates metabolic issues such as obesity and diabetes and is able to guide specific dietary and herbal strategies [26].

Developmental perspective: The knowledge regarding the change of Bones at Auto-generation to each stage of development from conception to birth (as in *Garbhavkranti Sharir*) is in consonance with embryology. This developmental perspective can be informative for pediatric care and regenerative medicine strategies [27].

4.3. Limitations and Challenges in Correlation

Correlation does not come without issues. The potential downside is the danger of false applicability, or anachronistic projection. We don't want to fall into the trap of trying to force Ayurvedic concepts into modern boxes. *Tridosha* (the theory of *Tridosha*) 54,55 is a distinctive concept, and to compare these Pitta-carrying *Siras* with veins simply may not be correct. There is more precise terminology from the Ayurveda point of view, like *Sira, Dhamani, Snayu* and Nadi, which does not have a direct one-to-one correlation with modern science [28]. Future studies should address functional correlates by, for instance, investigating the effects of interventions on certain *Srotas* or *Marma* points, not limited to structural implications.

4.4. Future Directions for Research

This review opens several avenues for future research:

1. **Embryological Studies:** Detailed comparative studies between Ayurvedic texts on fetal development (*Garbha Sharir*) and modern embryology.
2. **Imaging and Marma:** Using advanced imaging techniques (fMRI, DTI) to study the anatomical and functional correlates of *Marma* points.
3. **System Biology and Srotas:** Applying systems biology approaches to model the *Srotas* system and understand its role in holistic health and disease.
4. **Standardization of Terminology:** Developing a consensus glossary to accurately translate Ayurvedic anatomical terms for interdisciplinary research.

5. Conclusion

Sankhya Sharir is irrefutable evidence of the intellectual faculties and deep observational powers of the recorded past seers of Ayurveda. This broad survey shows that its numbers are not merely arbitrary, placeholder values but a consistent code of quantitative anatomy for investigating the body in health and disease. In its philosophical as well as practical perspective, *Sankhya Sharir* is surprisingly in parallel with many doctrines of contemporary anatomy and physiology. Instead of being written off as a quaint relic of the past, it needs to be thought about as yet another system of knowledge. By engaging in a respectful and nuanced conversation between these two venerable traditions, Ayurveda and modern medicine, we would inch closer to a more holistic, sensible, responsible and hence effective & integrative science of health & healing. Full understanding of the wisdom encoded in *Sankhya Sharir* has a long way to go, but when it happens, it shall expand our comprehension of the human body for ages.

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