



Review Article

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A CRITICAL INTERPRETATION OF SANDHI SHARIR ACCORDING TO ACHARYA SUSHRUTA -A REVIEW STUDY

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ABSTRACT

Background: Sandhi Sharir, the study of joints within Ayurvedic anatomy, is a fundamental aspect of the musculoskeletal system. Understanding the classification, structure, function, and pathology of Sandhis (joints) provides essential insights into both traditional and modern medical practices.

Objective: This study aims to provide a comprehensive review of Sandhi Sharir, integrating classical Ayurvedic literature with contemporary anatomical review. **Methodology:** A detailed literary review was conducted, focusing on classical Ayurvedic texts such as Acharya Sushruta. These texts were analysed for descriptions of joint types, functions, and related pathologies. Comparative analysis was done with modern anatomical classifications discussed. **Results: Classification and Structure:** Ayurvedic texts classify joints into three primary types: Sthira (immovable), Chala (movable), and partially movable Sandhis. These classifications correlate with the modern understanding of fibrous, cartilaginous, and synovial joints. **Pathology:** Common joint disorders, such as Sandhigata Vata (osteoarthritis), are discussed in terms of Ayurvedic pathophysiology, diagnostic criteria, and therapeutic approaches. Sushruta's surgical interventions for joint ailments are also reviewed, highlighting their relevance to modern orthopaedic practices. **Therapeutic Insights:** Ayurvedic treatments for joint disorders include Panchakarma therapies, herbal formulations, and lifestyle modifications, which show potential for integration with contemporary therapeutic strategies.

Discussion & Conclusion: This structured literary study on Sandhi Sharir bridges the ancient wisdom of Ayurveda with modern anatomical and physiological insights. It underscores the importance of joints in health and disease, advocating for a holistic approach to joint care. Further research is recommended to validate Ayurvedic concepts and integrate them into modern medical practice for enhanced joint health management.

Keywords: Sandhi Sharir, joints, Anatomy.

INTRODUCTION

Sandhi Sharir, the detailed study of joints within Ayurvedic anatomy, is a vital component in understanding the human musculoskeletal system. Joints, referred to as Sandhis in Ayurveda, are the pivotal structures that connect bones, enabling movement and providing stability.[1] They are integral to facilitating a wide range of bodily motions, supporting structural integrity, and maintaining the overall functionality of the skeletal framework.[2] The Classical Ayurvedic texts such as Sushruta Samhita, offer comprehensive insights into the classification, structure, and function of joints. [3]

Joints, or articulations, are the physical connections between bones in the human body.[4] They are essential for providing both stability and mobility, allowing the skeleton to move in various ways while also maintaining its structural integrity.[5] Without joints, the rigid bones of the skeleton would be unable to perform the complex movements necessary for everyday activities such as walking, running, and grasping objects.[6]

Structural & Functional Classification of Joints [7]

Joints are classified based on their structure into three main categories: fibrous, cartilaginous, and synovial. Fibrous joints are connected by dense connective tissue and are typically immovable, such as the sutures in the skull. Cartilaginous joints, connected by cartilage, allow for limited movement and are found in places like the intervertebral discs of the spine. Synovial joints, which are the most common and most movable type of joint in the body, have a synovial cavity filled with fluid, allowing for a wide range of motion.

Functionally, joints are categorized based on the degree of movement they allow: synarthroses (immovable joints), amphiarthroses (slightly movable joints), and diarthroses (freely movable joints). Synarthroses provide stability and protection, such as the joints in the skull. Amphiarthroses, like the joints between the vertebrae, offer a balance between mobility and stability. Diarthroses, which include most limb joints, allow for extensive movement, making them crucial for activities that require a high degree of flexibility and precision.[8]

AIM AND OBJECTIVES

AIM -To evaluate the Sandhi Sharir comprehensive understanding of their structure, function, and clinical significance.

OBJECTIVES

- To Understanding the Anatomical Structure
- Analyzing Functional Significance
- Investigating Pathological Conditions:
- Exploring Diagnostic and Therapeutic Approaches:

Methodology

Literature Review:

Ayurvedic Literature: Comprehensive review of classical texts focusing on the classification, structure, and function of joints as described in Ayurveda.

Modern Medical Literature: Review of contemporary anatomical texts, research articles, and clinical guidelines to understand the current scientific perspective on joints.

CONCEPT OF SANDHI SHARIR

Sandhi Sharir, or the study of joints in Ayurvedic anatomy, forms a fundamental aspect of understanding human biomechanics and physiology. Joints, known as Sandhis in Ayurveda, are critical for movement, stability, and overall skeletal function. This comprehensive study aims to delve into the classical Ayurvedic perspectives on joints, exploring their classification, structure, physiological functions, and pathological conditions.[9] By integrating ancient wisdom with modern scientific insights, we can appreciate the holistic approach of Ayurveda towards joint health and disease management.

Classification of Sandhi (Joints) [10]

Cheshtavanta Sandhi [11]

These joints, located in the limbs, jaw, and lower back, are vital for movement. They are categorized further into:

- **Bahu Chala (Freely Movable):**

- **Examples:** Shoulder, hip, and knee joints allow extensive movement in multiple directions, essential for tasks like walking, running, and lifting.
- **Clinical Significance:** Susceptible to injuries like dislocations and ligament tears, common in active individuals and athletes.

- **Alpachala (Slightly Movable):**

- **Examples:** Intervertebral discs in the spine allow limited movement, providing stability while enabling flexibility.
- **Clinical Significance:** Degenerative diseases like herniated discs can affect these joints, leading to back pain and nerve compression.

Sthira Sandhi [12]

Immovable joints provide structural stability and protection. Examples include the sutures in the skull, which fuse as a person matures, forming a rigid protective case for the brain.

Structural Classification [13]

1. **Kora Sandhi:**

- **Function:** These joints enable bending and straightening motions.
- **Clinical Significance:** Commonly affected by osteoarthritis, leading to pain and reduced mobility in areas like the knees and elbows.

2. **Ulukhala Sandhi :**

- **Function:** Facilitate rotational movements.
- **Clinical Significance:** Injuries or degenerative changes can limit rotational capabilities, affecting activities like lifting and twisting.

3. **Samudga Sandhi:**

- **Function:** Allow sliding movements necessary for activities like shrugging shoulders and bending at the waist.

- **Clinical Significance:** Conditions like frozen shoulder can severely restrict movement in these joints.

4. **Pratara Sandhi:**

- **Function:** Enable slight gliding movements, providing flexibility and support.
- **Clinical Significance:** Degenerative diseases can lead to friction and pain in these joints, particularly in the spine.

5. **Tunnasevani Sandhi:**

- **Function:** Provide protection and structural integrity.
- **Clinical Significance:** Premature fusion of these joints in the skull can cause developmental issues, requiring surgical intervention.

6. **Vayastunda Sandhi:**

- **Function:** Allow a wide range of movements, including rotation.
- **Clinical Significance:** Susceptible to dislocations and arthritis, significantly impacting mobility and quality of life.

7. **Mandala Sandhi:**

- **Function:** Facilitate complex movements essential for vision and neck flexibility.
- **Clinical Significance:** Conditions like torticollis can affect these joints, leading to restricted neck movement.

8. **Shankhavarta Sandhi:**

- **Function:** Allow intricate movements in the ear and head regions.
- **Clinical Significance:** Infections or structural anomalies in these joints can affect hearing and balance.

Surgical Interventions in Sandhi Sharir-[14] Sushruta Samhita, a classical Ayurvedic text, details surgical techniques for managing joint disorders. These interventions, although ancient, offer insights into the development of orthopaedic surgery.

1. Agnikarma:

- **Description:** The application of heat to relieve pain and inflammation in joints.
- **Modern Correlation:** Similar to modern techniques like cauterization and diathermy used for pain management.

2. Raktamokshana:

- **Description:** The removal of impure blood to reduce inflammation and pain.
- **Modern Correlation:** Comparable to therapeutic phlebotomy used in conditions like polycythemia and gout.

3. Sandhana Karma:

- **Description:** Procedures to realign and stabilize dislocated or fractured joints.
- **Modern Correlation:** Aligns with modern orthopedic surgeries, such as reduction of dislocations and fixation of fractures.

Therapeutic Approaches in Ayurveda

Ayurveda offers a holistic approach to joint health, combining detoxification, herbal medicine, and lifestyle modifications.

1. Panchakarma Therapies:

- **Virechana (Purgation):** Eliminates toxins and balances doshas.
- **Basti (Medicated Enemas):** Effective in managing Vata-related joint disorders by delivering medicated oils and decoctions directly to the colon.

2. Ayurvedic Formulations:

- **Guggulu:** Known for its anti-inflammatory and analgesic properties.
- **Shallaki (Boswellia serrata):** Reduces pain and improves joint function.

3. Diet and Lifestyle:

- **Diet:** Emphasis on a Vata-pacifying diet, rich in anti-inflammatory foods and herbs.

- **Lifestyle:** Regular exercise, yoga, and stress management to maintain joint health and prevent disorders.

MODERN REVIEW

Joints, also known as articulations, are crucial components of the human skeletal system, facilitating movement and providing mechanical support. This review covers the types and classification of joints, as well as their clinical significance in the context of modern medicine.

Types and Classification of Joints [15]

Joints can be classified based on their structure and function. Structurally, they are categorized into three main types: fibrous, cartilaginous, and synovial joints. Functionally, joints are classified according to their degree of movement: synarthroses (immovable), amphiarthroses (slightly movable), and diarthroses (freely movable).

1. Fibrous Joints (Synarthroses)

- **Structure:** These joints are connected by dense connective tissue, primarily collagen.
- **Types:**
 - **Sutures:** Found between the bones of the skull, these joints are immovable and fuse over time.
 - **Syndesmoses:** Joints where bones are connected by a ligament or an interosseous membrane, allowing for slight movement (e.g., the distal tibiofibular joint).
 - **Gomphoses:** A peg-in-socket fibrous joint, such as the connection between teeth and their sockets in the jawbone.
- **Clinical Significance:** Disorders like craniosynostosis, where sutures fuse prematurely, can affect skull shape and brain development. Syndesmotomic injuries, common in ankle sprains, involve damage to the syndesmosis ligament.

2. Cartilaginous Joints (Amphiarthroses)

- **Structure:** These joints are connected entirely by cartilage (hyaline or fibrocartilage).
- **Types:**
 - **Synchondroses:** Bones joined by hyaline cartilage, allowing for very little movement (e.g., the epiphyseal plates in growing bones).
 - **Symphyses:** Bones joined by fibrocartilage, providing strength with flexibility (e.g., the pubic symphysis and intervertebral discs).
- **Clinical Significance:** Conditions such as herniated discs result from the displacement of the nucleus pulposus in the intervertebral discs, causing pain and nerve compression. Symphysis pubis dysfunction is a common issue during pregnancy, affecting pelvic stability.

3. Synovial Joints (Diarthroses)

- **Structure:** These joints have a fluid-filled synovial cavity, articular cartilage, a joint capsule, and supporting ligaments.
- **Types:**
 - **Plane Joints:** Allow gliding movements (e.g., intercarpal joints of the wrist).
 - **Hinge Joints:** Permit flexion and extension (e.g., elbow and knee joints).
 - **Pivot Joints:** Allow rotational movement (e.g., the atlantoaxial joint in the neck).
 - **Condylloid Joints:** Permit movement in two planes (e.g., the radiocarpal joint in the wrist).
 - **Saddle Joints:** Allow movement in two planes, similar to condylloid joints but with a saddle shape (e.g., the carpometacarpal joint of the thumb).
 - **Ball-and-Socket Joints:** Allow the most freedom of movement in all axes and planes (e.g., shoulder and hip joints).
- **Clinical Significance:** Synovial joints are commonly affected by arthritis, including osteoarthritis and rheumatoid arthritis, leading to pain, swelling, and reduced

mobility. Dislocations and ligament injuries, such as anterior cruciate ligament (ACL) tears, are also significant clinical concerns.

Clinical Significance of Joints [16]

The clinical significance of joints is vast, encompassing a range of conditions from congenital abnormalities to degenerative diseases and traumatic injuries.

1. Congenital Abnormalities:

- **Developmental Dysplasia of the Hip (DDH):** A condition where the hip joint is improperly formed, leading to instability and potential dislocation. Early detection and treatment are crucial to prevent long-term disability.
- **Clubfoot:** A congenital deformity where the foot is twisted out of shape or position, often affecting the ankle joint. Treatment typically involves casting or surgery.

2. Degenerative Diseases:

- **Osteoarthritis (OA):** A degenerative joint disease characterized by the breakdown of articular cartilage, leading to pain, stiffness, and reduced function. It commonly affects weight-bearing joints such as the knees and hips.
- **Rheumatoid Arthritis (RA):** An autoimmune disorder that primarily affects synovial joints, causing inflammation, pain, and eventual joint destruction. Early and aggressive treatment can help manage symptoms and prevent progression.
- **Gout:** A form of inflammatory arthritis caused by the accumulation of uric acid crystals in the joints, leading to sudden and severe pain, often in the big toe. Dietary modifications and medications can help manage the condition.

3. Traumatic Injuries:

- **Fractures:** Broken bones can involve joint surfaces, leading to complications such as joint instability and post-traumatic arthritis. Proper alignment and healing are critical to restoring function.

- **Dislocations:** Occur when the bones in a joint are forced out of their normal positions. Immediate medical attention is required to reduce the dislocation and prevent damage to surrounding tissues.
- **Ligament Injuries:** Common in athletes, ligament tears (e.g., ACL in the knee) can significantly impair joint stability and function. Treatment options range from physical therapy to surgical reconstruction.

4. Inflammatory Conditions:

- **Bursitis:** Inflammation of the bursa, a fluid-filled sac that reduces friction in joints. It can cause pain and swelling, often in the shoulder, elbow, or knee.
- **Tendinitis:** Inflammation of tendons, commonly affecting joints such as the shoulder (rotator cuff tendinitis) and elbow (tennis elbow). Rest, physical therapy, and anti-inflammatory medications are typical treatments.

5. Metabolic Disorders:

- **Osteoporosis:** A condition characterized by decreased bone density and increased fracture risk, often affecting joints such as the spine, hips, and wrists. Calcium and vitamin D supplementation, along with weight-bearing exercise, are key preventive measures.
- **Hemophilia:** A bleeding disorder that can lead to hemarthrosis (bleeding into joints), causing pain and joint damage. Regular clotting factor replacement therapy is essential for management.

6. Infectious Conditions:

- **Septic Arthritis:** An infection in a joint, typically caused by bacteria, leading to severe pain, swelling, and fever. Prompt antibiotic treatment and drainage are necessary to prevent joint destruction.
- **Lyme Disease:** Caused by the bacterium *Borrelia burgdorferi*, transmitted by tick bites. It can lead to Lyme arthritis, characterized by joint inflammation, particularly in the knees.

DISCUSSION

The study of Sandhi Sharir, or the anatomy of joints, offers a unique opportunity to integrate ancient Ayurvedic knowledge with contemporary scientific understanding. This integration not only enhances our appreciation of joint anatomy and function but also provides a Ayurvedic approach to the diagnosis and treatment of joint disorders.[17]

Ayurveda provides a detailed classification of joints based on their structure and function, which parallels modern anatomical classifications. The division into Cheshtavanta and Sthira sandhi reflects a sophisticated understanding of joint mechanics. Similarly, the structural classification into types such as Kora sandhi, Ulukhala sandhi, and Samudga sandhi highlights the diverse forms and functions of joints within the body.[18] These ancient classifications align closely with modern categorizations of fibrous, cartilaginous, and synovial joints, underscoring the enduring relevance of Ayurvedic insights.

The role of Shleshaka Kapha in joint health, a concept that resonates with the modern understanding of synovial fluid. Shleshaka Kapha is described as a lubricating and nourishing agent within the joints, much like synovial fluid, which reduces friction and provides nutrients to the articular cartilage.[19]

Ayurveda's detailed descriptions of joint disorders, such as Sandhigata Vata (osteoarthritis) and Aamavata (rheumatoid arthritis), provide valuable insights into their etiology and progression. The Ayurvedic approach to these conditions involves a holistic assessment of doshic imbalances, lifestyle factors, and dietary habits. This contrasts with the primarily symptomatic approach of modern medicine, offering a more comprehensive strategy for long-term management and prevention. [20]

Ayurvedic therapeutic approaches emphasize natural and Ayurvedic treatments that align closely with preventive and supportive care. Panchakarma therapies, which include detoxification and rejuvenation procedures, aim to restore doshic balance and eliminate toxins. Herbal formulations, tailored to individual constitutions (Prakriti), provide targeted relief from inflammation and pain while supporting overall joint health. These treatments can complement modern medical interventions, potentially reducing the need for long-term pharmacological therapy and minimizing side effects.[21]

Clinical Relevance [22]

Integrating Ayurvedic principles into modern clinical practice can enhance the management of joint disorders. For instance, incorporating Ayurvedic diagnostics such as Nadi Pariksha (pulse diagnosis) with modern imaging techniques can provide a more nuanced understanding of a patient's condition. Furthermore, Ayurvedic dietary and lifestyle recommendations can serve as preventive measures, reducing the incidence and severity of joint disorders. Combining Ayurvedic diagnostic methods with modern tools like MRI and X-rays can improve diagnostic accuracy and treatment planning. Emphasizing Ayurvedic lifestyle and dietary guidelines can help prevent joint disorders and support overall musculoskeletal health.

Research and Validation [23]

There is a growing need for research to validate Ayurvedic treatments for joint disorders through rigorous scientific studies. Clinical trials assessing the efficacy of Panchakarma therapies and herbal formulations can provide empirical evidence to support their integration into mainstream healthcare. Collaborative research efforts can bridge the gap between traditional and modern medicine, fostering an evidence-based approach to holistic joint health.

CONCLUSION

The study of Sandhi Sharir, which focuses on the anatomy and function of joints, bridges ancient Ayurvedic knowledge and modern scientific understanding. Joints are vital for mobility, stability, and overall skeletal health. Ayurveda's detailed classifications and descriptions of joints align closely with modern anatomical categorizations, demonstrating the enduring relevance of ancient insights. Ayurvedic concepts such as Shleshaka Kapha, akin to synovial fluid, highlight the Ayurvedic approach to joint health. Detailed concept of joint disorders like Sandhigata Vata (osteoarthritis) and Aamavata (rheumatoid arthritis) provide comprehensive frameworks for understanding and managing these conditions. Combining Ayurvedic diagnostics with modern techniques enhances diagnostic accuracy and treatment outcomes. Preventive measures from Ayurveda, rooted in lifestyle and dietary recommendations, can reduce the incidence of joint disorders. Collaborative research is

essential to validate Ayurvedic treatments and foster an evidence-based holistic approach to joint health. The integration of Sandhi Sharir with modern science offers a comprehensive and effective strategy for managing joint health, combining the strengths of both traditions to improve quality of life.

CONFLICT OF INTEREST -NIL

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