ANATOMICAL PERSPECTIVES OF ASTHI SHARIRA AND RELATED ABNORMALITIES: AN AYURVEDA REVIEW

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Article Received on 13/06/2023  Article Revised on 04/07/2023  Article Accepted on 25/08/2023

ABSTRACT
Dosha, Dhatu and Mala are three major elements of the body classified as fundamental components by ancient philosopher of Ayurveda. Dharana & Poshana of Sharira is major functions of Dhatus and Asthi is one of them. Asthi is the hard framework of body which supports body and forms internal skeleton. Ayurveda Samhitas encompasses sufficient information about the Asthi Sharira and this knowledge considered beneficial for Ayurveda physician involving in disease diagnosis and management. The ancient Indian text described various aspects of Asthi Sharir (osteology) including anatomical and physiological perspectives. Physiologically Asthi dhatu acquire great significance since it connects body, provides structure and frame, gives stability to the body, nourishing nervous tissue, facilitates movement and responsible for body posture, etc. The abnormalities related to the Asthi Sharir also mentioned in various traditional texts along with their therapeutic management. Present article described constituents, types, anatomical and pathological aspects of Asthi Sharir.

KEYWORDS: Ayurveda, Sharirrachna, Asthi, Dhatu, Osteology.

INTRODUCTION
Asthi as a hard part of body provides rigidity and physical built up which also support many physiological activities. Keekas, Kalyanam and Hada are the synonym of Asthi, which resembles hard substance that provides support to the body. Asthi Dhatu described as tissue-humoral systems of body which are formed in a sequential manner. Asthi Dhatu is one of the important Dhatu of the body which remain present inside the Mamsa Dhatu.

Asthi is predominant to Prithivi and Vayu Mahabhuta amongst the Panchabhautika constitution. Prithivi and Vayu Mahabhuta impart their quality of firmness and movement into the Asthi Dhatu. Asthi possess dry and rough nature due to the predominance of Vayu Mahabhuta while Prithivi Mahabhuta imparts quality of heaviness. The roughness, toughness, hardness and dryness of Asthi is due to the predominance of specific Mahabhuta constitution.1-4

Ayurveda gives various perspectives related to the anatomical aspects of body, in this connection Ayurveda suggested different concepts of skeleton system or Asthi Sharira. The Asthi is described as important Dhatu of human body, which gives rigidity and support to the human body. Asthi is responsible for Majja Pushhti and Deha Dharana, it supports Mansma Dhatu, connects frame work of body and provides physical strength. The Sankhya of Asthi according to different philosophies is depicted in Figure 1.

Figure 1: Sankhya of Asthi according to different philosophies.

Upatti and Poshana of Asthi Dhatu
Rasa converted into Raktu after being digested by Rasagni and Raktu digested by Raktaagni to forms Mansa. Similarly Dhatus gets converted into others preceding Dhatu. The newly formed Dhatu nourished by Dhatwagni of particular Dhatu. The Upatti and Poshana of Asthi Dhatu take places in similar way. The
Ghanatava of Asthi Dhatu is due to the Vayu Mahabhuta and Snighatava is due to the Jala Mahabhuta.

Anatomical Aspects
Asthi is considered as seat of Vata and acts as Ashraya and Vata acts as Ashrayee. Snaya are tied with Asthi in body. Asthi play anchor role towards the specific frame work of body and supported by Snayu, Dhamni and Sirā.\(^{[4-6]}\)

Asthidhara Kala is related with Purisha dhara kala which exits in Pakvashaya; it separates waste products in colon. The formation of Vata and Purisha affects qualities of Asthi Dhatu, therefore Purisha-Dhara Kala can be correlated with Asthi-Dhara Kala. The Danta is considered as Upadhatu of Asthi and Asthi also produces Malas as similar to other Dhatus. Kesh, Lomai and Nakha are considered as Malas of Asthi. Asthi possess Guru, Kathin, Shhula, Kharai and Shtira Gunas. The distribution of Asthi in the Shadanga of Sharira is depicted in Table 1.

Table 1: Distribution of Asthi in the Shadanga of Sharira.

<table>
<thead>
<tr>
<th>According to Sushruta Samhita</th>
<th>According to Ashtanga Srautasastra</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shaurkha</td>
<td>140</td>
</tr>
<tr>
<td>Shroni, Parshva, Prathsha, Ur</td>
<td>117</td>
</tr>
<tr>
<td>Greevordhva</td>
<td>63</td>
</tr>
<tr>
<td>Shaurkha</td>
<td>140</td>
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<tr>
<td>Madhya Sharira</td>
<td>120</td>
</tr>
<tr>
<td>Urdhva Sharira</td>
<td>100</td>
</tr>
</tbody>
</table>

Types of Asthi
Kapalasthi, Valayasthi, Tarunasthi, Nalikasthi and Ruchakasthi are various types of Asthi classified based on their size, shape and position.

- **Kapalasthi** are flat in nature, which covers brain. These Asthi’s found in Nitamba, Janu, Ansa, Talu, Shankha, Ganda, Madhyashira and Vankshana.
- **Valayasthi** are round or hemi circle in shape. These Asthi found in Pada, Pani, Ura, Prustha and Parshva area of body.
- **Tarunasthi** are soft, which are considered as bones which have not fully developed i.e. bones of child. Taruna Asthi’s present in Gheeua, Akshikuta Ghraha and Karna.
- **Nalikasthi** are tubes like long bones and hollow from the inside. Pada Anguli, Hasta Anguli, Pada Talu, Kurcha, Jangha Asthi and Bahu Asthi, etc. are described as Nalaka Asthi.
- **Ruchakasthi** are meant to chew food and facilitate taste sensation. The Dashanas resembles Ruchakasti which are 28 or 32 in number, in this regard Danta can be considered as Asthi of this category.\(^{[6-8]}\)

ABNORMALITIES/ASTHI VIKARAS
Injury, surgical accident, trauma and congenital issues, etc. may affects health status of Asthi Sharira and causes problem in physiological functioning associated with Asthi Sharira. Adhidanta, Adhyasthi, Dantaheda, Asthiheda, Asthihoola, Dantashoola, Vivarnata, Smashru Dosha, Asthi toda and Kunakha, etc. are Asthi Pradoshaja Vikaras which are mentioned in different Ayurveda texts. Yogendranath Sen mentioned Loma, Smashru and Kesha as Malas of Asthi Dhatu, therefore some texts considered Keshadi Doshas as Asthi Pradoshaja Vikara.

Trauma or Injury Effects
1. Tarunasthi (Cartilage) get bent after trauma.
2. Nalikasthi (Long bones) get break due to the injury
3. Kapalasthi (Flat bones) gets cracked after trauma or injury.

Furthermore, various Asthi Pradoshaja Vikaras, or bone-

The ancient texts classified skeletal injuries into two types; Sandhimukta and Kandabhagna, which described as joint dislocation and bone fracture respectively in modern science. The Karkatakata, Churnitam, Ashwakarana, Pichhitam, Asthichallita, Majanugatam, Kanda bhagha, Atpatitam, Chinnam, Vakra, Sputia and Patitam are different types of Kandabhagna.\(^{[6-11]}\)

The Ayurvedic text has described various approaches of Asthibhagna Chikitsa which includes following approaches:

- **Ancan**: To apply traction
- **Pidana**: Manipulation by local pressure
- **Sankshep**: Opposition and stabilization of fractured part of bone
- **Bandhan**: Immobilization.

CONCLUSION
Asthi serves as the sturdy foundational framework within the body, providing structural support and forming the internal skeleton. Ancient Indian texts expound upon various dimensions of Asthi Sharir, encompassing both anatomical and physiological perspectives. Asthi emerges as a pivotal Dhatu, contributing to bodily rigidity and support. It is also responsible for nurturing Maisha and Deha Dharana, supporting the Mamsha Dhatu, integrating the body's framework and enhances physical resilience. Kapalasthi located in areas like Janu, Ansa, Nitamba, Talu, Shankha, Madhyashira and Ganda, etc. Valayasthi characterized by their rounded or semi-circular shape. Tarunasthi exhibiting a softer nature, found in Gheeua and Karna. Nalikasthi resembling elongated tubes with hollow interiors, encompass bones like Hasta Anguli, Pada Anguli, Pada Talu and Jangha Asthi, etc. Ruchakasthi serve the purpose of masticating food and enhancing the sense of taste. Danta can be categorized as an Asthi within this classification.
related disorders, are elaborated upon in diverse Ayurvedic texts, including Adhyasthi, Adhidanta, Dantabhedda, Asthisohola, Asthibheda, Dantashohola, Smashru Doshaha, Asthi toda and Vivarnata, etc. Pidana and Bandhan, etc. are some ancient approaches which are used to align and stabilize fractured bone segments.

REFERENCES