A CRITICAL REVIEW OF ASTHI DHATU
W.S.R. TO ASTHYAGNI

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Abstract In Ayurveda, Dosha Dhatu and Mala play an crucial role in healthy functioning of the body. Asthi fifth amongst the seven Dhatu, endowed with the function of Sharira Dharana, and Majja Pushti. It also gives shape to the body and protect vital organs. According to Ayurveda, healthy formation of a particular Dhatu depends on the status of respective Dhatvagni. There are seven Dhatvagni, respective to each Dhatu and plays important role in appropriate formation and development of Dhatu. Similarly Asthyangi is Ushma that is responsible for formation of Asthi Dhatu proper, Asthi Updhatu, Asthi Mala and Sukshmansh of successive Majja Dhatu. If Asthyagni is good status, healthy Asthi Dhatu will be formed. So, it’s crucial to know about Asthyagni to know Asthi Dhatu properly. In this Review article Asthi Dhatu and role of Asthyagni has been discussed in detail.

Index Terms - Asthi Dhatu, Medo Dhatu, Asthyagni, Dhatvagni, Dhatu, Ushma

I. INTRODUCTION
Ayurveda is the science which is nurturing this universe from the beginning of human civilisation by its holistic approach. Ayurveda not only emphasizes structural entities but also comprehensively categorize functional variations under group of three viz. Dosha, Dhatu and Mala. In their normal states, Dosha help in the proper functioning of the body. The term Dhatu refers to the physiological basics of nutritional and structural factors in the human body. The Term Dhatu refers to Dharana Karma (to support) and Poshana Karma (to nourish). The basic tissue of body which support viz. Rasa, Rakt, Mamsa, Meda, Asthi, Majja, Sukra is Dhatu(1). Asthi is the fifth Dhatu. It is hardest and give solid structure to body. Asthi Dhatu is present in whole body and performs Deha Dharamm (gives support to the body) and Majja Pushti (Nourishes bone marrow)(2) in healthy individual. Asthi Dhatu is compared with bones (osseous tissue of our body). Bone is a type of stiff connective tissue that makes up the body's skeleton. Bone’s structure, function and physiology is similar to Asthi Dhatu described in Ayurvedic Classics.

II. Aims and Objectives
1. To re-evaluate and elucidate on the various Ayurvedic concepts related to Asthi Dhatu.
2. To analyze and compare, textual information available on Asthi Dhatu and Bone/osseous tissue.

III. Study Type
It is a literary review of Asthi Dhatu.

IV. Materials And Methods
To harvest the literary material, Ayurvedic texts, principally Charak Samhita, Sushrut Samhita, Ashtang Hridaya, Ashtang Sangraha, and their commentaries, modern physiology textbooks, websites, and articles related to the topic, were reviewed. The compiled data was compared and presented to investigate Asthi dhatu knowledge.
1.1 Concept Of Asthi Dhatu and Bone:

Asthi is fifth among the metamorphic chain of seven Dhatu (3) and exists in entire body (4). Asthi is interpreted as Long-Lasting element of our body. It is the essence of body like the annual ring of the tree, binding all branches to it (5). Dhatu are of two types according to Ayurveda – Sthayi Dhatu and Poshaka Dhatu. Asthi or bones are some forms of the total Sthayi Asthi Dhatu. Asthi may be in liquid form as mentioned by Acharya Chakrapani, the Poshaka Asthi Dhatu flows through Asthivaha Srotas & supplies nutrition to Sthayi Asthi Dhatu. According to modern view, description of Osseous tissue is similar to that of Asthi Dhatu of Ayurveda. Poshaka Asthi Dhatu can be taken as nutrients for Asthi (Ca, P.etc.) carried out by blood circulation to Sthayi Asthi Dhatu. Organic minerals are embedded in organic matrix in the bone frame work, which is made up of collagen fibres. Calcium 99 percent, phosphate 86 percent, carbonate 80 percent, magnesium 50 percent, sodium 35 percent, and water 8 percent of the body composition build inorganic components in the bone. Collagen strands offer bone tensile strength by adhering to the lines of tensional force. Hydroxyapatites Ca10(PO4)(OH)2 are (crystalline salts) found in the organic matrix of bones that mostly comprise calcium and phosphate. Bone salts help to keep the bone matrix strong. The bone contains salts other than calcium and phosphate, such as sodium, potassium, magnesium, and carbonate.

1.2 Asthi Sankhya: Number of bones are variant in Brihatrayi and Modern Science and this is briefed in table 1.2.1

1.2 Vyutpatti of Asthi Dhatu

Asthi is a hard substance found within the soft mass, i.e. muscles(6).

1.3 Nirakti of Asthi Dhatu

Just as a tree stands with the help of Sara's inner hard core, a human being stands with the help of Asthi's inner hard core(7).

1.4 Upatti:

Asthi is produced during garbhavastha (intra uterine) life. Growth and nourishment by Aahar just like any other Dhatu (8). Asthi is formed from the Medo Dhatu (9). Precursor of Asthi Dhatu (Poshak Asthi) is formed at the time of formation of Medo Dhatu. Nutrients of Asthi Dhatu (Poshak Asthi) reaches the Asthivaha Srotas where it is acted upon by Asthi Dhatwagni and results in formation of Poshya Asthi Dhatu, Asthi Mala (Kesh, Loma, & Shmashra), Updhatu (Dantu) and the formation of Poshak Majja Dhatu. Asthi Dhatwagni take action on Agni, Vata and Prithvi prevalent part of nutrients and changes it to hard substance. From this Asthi Dhatu is generated(10) Medo Dhatu is fluidly Dhatu and also unctuous. From Medo Dhatu, Asthi Dhatu is produced with the help of Prithvi, Teja and Vayu, Prithvi is needed for conversion of fluid Meda to solid Asthi, Teja, is needed for Khara or rough property and Vayu is needed for drying the fluid. In this manner the hard Asthi is produced.(11)

1.5 Panchabhautika Constitution Of Asthidhatu:

According to Chakriapani in Bhanumati teeka of Sushruta Samhita 15/8, In spite of presence of all Five Mahabutas, Asthi has predominance of Prithvi and Vayu Mahabhuta. According to Chraka Samhita Asthi Dhatu is predominant in Prithvi, Agni and Vayu. because of Prihi Maha Bhata Asthi Dhatu has Sthira (Stability), Kathin (Hardness) and Kharatva Guna, because of the Vayu Asthi has Raksha, Saushirya (Porosity) Guna, and Agni Maha Bhuta is responsible for the conversion of Snigdha, Slakshna Medo Dhatu into Khura, Kathin, Asthi Dhat (12).

1.6 Asthivaha Srotas

Only Charaka Samhita has described the Asthivaha Srotas. Srotas is such Channels in living body, where absorption, conversion of nutrients takes place and then transportation to proper places takes place.
1.6.1. Mulasthana-

The Mulasthana of Asthivaha Srotas is principle organs from where a specific Dhatu originate or found in abundance. Likewise, Asthi Dhatu Mulasthan are MedoDhatu and Jaghana (13)(groin region/flat pelvis bones). Commentator explain that Asthi Dhatu is found in fluid from and therefore word Asthivahanam or convey of Asthi Dhatu is used (14).

1.6.1.1 Meda

Nourishment of Asthi Dhatu depends upon proper nourishment of Medho Dhatu. Meda is the 4th Dhatu and formed before Asthi Dhatu and Asthi is formed from Asthiposhakanash of Meda. So Meda is the Mulasthana of Asthi.

1.6.1.2 Jaghana

Charak Samhita mentioned “Jaghana” as one of the primary organs of Srotas for Asthi Dhatu. Any issue with the “Jaghana,” or pelvic regions causes a disruption in the upright position of the living body, because the pelvic bones are pillars of the body that serve the function of Dharana. Because Asthi Dhatu performs this function, Jaghana is also a root of Asthivaha Srotas. Jaghana means pelvic bone. In this area of body bones are very broad and thick as compared to others. So, the Jaghana is also Mula of Asthivaha Srotas.

2 Asthi Dhara Kala

Acharya Sushruta has described seven Kala. Asthidhara Kala is not described by Sushruta. Commentator Dalhan explain on Su. Kalpa 4:40 in Vishavega Prakaran, the Purisha-Dhara Kala is also called the Asthidhara Kala.

3. Functions Of Asthi Dhatu:

1. Asthi Dhatu is responsible for appropriate posture of the body. It keeps body in erect position or supports the body(15).

2. It also nourishes next Dhatu Majja Dhatu (16). Proper nourishment of Majja Dhatu depends on proper metabolism of Asthi, because Poshaka Majja Dhatu is formed during the formation of Asthi Dhatu.

3. Asthi Dhatu form skeleton of the whole body, function of Asthi Dhatu is compared to the hard core of bark of the tree. The core part of tree called ‘Sara’, because this part of tree holds it in upright position. Same as human stays upright due to Asthi Dhatu. When body deteriorates skin, soft tissue gets destroyed, since they are “Sara” portion. Asthi get strongly bounded by Mamsa Dhatu and with the help of ‘Sira,’ and ‘Snaya’ they keep body in upright position without deterioration of falling off: (17)

4. Nail and body hair are Mala of Asthi Dhatu. They are nourished by Asthi Dhatu.

5. According to Sharangadharana Teeth are Upadhatus of Asthi Dhatu and nourishment of teeth from the Asthi Dhatu.

6. Asthi Dhatu protects various important organs for e.g Skull bone protects Brain, Ribs protects lung and Heart.

4. Mala of Asthi Dhatu :-

According to Acharya Charak Kesha (Hair) and Loma (Hair on the skin) are considered as Mala of AsthiDhatu(18). Where, Acharya Sushruta stated in Sutra Sthana that nails and body hair are Mala of Asthi Dhatu. (19)

5. Updhatu of Asthi Dhatu:-

Upadhatu of Asthi Dhatu has not described by Acharya Charka and Shushruta. Only Acharya Sharangdharana has mentioned the Updhatu of Asthi. According to Acharya Sharangdharana, Danta (teeth) are Upadhatu means the Secondary tissue of Asthi.(20)

6. Dhatwagni/Dhatu Paka

According to Acharya Charaka, Amaranasa or Sarabhaga of food ingested, result of jathragni and Bhutagni Paka is absorbed and distributed throughout the body by Dhamani (21). The concept of Dhatwagni Vyapar or Dhatwagni Paka can be used to describe this phenomenon. The process of Dhatu and Sara metamorphosis begins after the alimentary canal digestion and food metabolism. This stage corresponds to the intermediary metabolism described in modern physiology and biochemistry. Chakrapani Datta describes Dhatu as having two types: Sthayi (fixed, stable, already formed, and existing) and Asthayi (that
which meant to be nourished). The elements required for the synthesis of substances directly concerned with the seven species of Sthayi Dhatu were absorbed from Adho-Amashya (Kshudratantra or small intestine). These nutrient elements are still Vijatiya (Heterogeneous) to the body and must be converted to Sajatiya (Homogeneous) before they can be used to synthesise the Dosha and Dhatu. The conversion or transformation is termed as Paka which is brought about by specific kinds of Ushma associated with each species of Dhatu. The use of the term Dhatwagni made more frequently in the classical works of Ayurveda, as these are Ansa of Kayagni. The seven kinds of Dhatwagni, corresponding to seven species of Sharir Dhatu: Rasagni, Raktaagni, Mamsagni, Medagni, Asthyagni, Majjagni, Shukragni. Dhatwagni Paka is said to produce seven types of Poshya or Asthayi Dhatu, followed by Kitta or Mala. Each of the seven types of Dhatu is said to be transported to the respective Poshya or Sthayi Dhatu for construction via Srotas or channels specific to each Sthayi Dhatu. Dhatvaha Srotas are seven in number: Rasavaha Srotas, Raktavaha Srotas, Medavaha Srotas, Asthivaha Srotas, Majjavaha Srotas, and Sukravaha Srotas.

7. Development of Asthi Dhatu

When Asthayi Asthi Dhatu flows through Asthivaha Srotas i.e. (Meda Dhatu and Jaghana) is metabolise by Asthyagni and Parthivagni. Agneyagni and Vayavyagni gets converted into following portions. Sthula part becomes rough and hard, due to Vayavyagni which nourishes the existing Sthayi (Asthi) Dhatu. Suksma part contains unctuous substance becomes Asthayi Majja Dhatu or Majja poshaka ansa. Kitta part nourishes the Asthi Kitta such as Kesa, Samshra, Loma and Nakha. The continuous and proper metabolism of Asthi Dhatu by Asthyagni produces excellent Asthi which develops the Asthi Sara Laksana.

8. Asthi Sara

According to Acharya Charka (22) and Sushruta (23) the persons with excellence of Asthi Dhatu have strong and stout bones and joint especially of ankles, heel, knees, forearms, collar bone, chin and head. Large and broad, head will be present. Their bones, teeth and nails are also very strong. These look very enthusiastic and active. They have strong and firm body as well as longevity of life.

9. Asthyagni

Asthyagni’ means ‘Pittoshma’ concerned with Asthi Dhatu. In common parlance, Asthi is equated with osseous tissue. The structure holding our body and muscles are affixed to them. The Asthi or bone keeps the body stable and provides the basis for the movement. They reflected as essence of the body. Just as trees have their endoderm or wood.

The formation of Asthi Dhatu starts from uterus of the mother. By the inspiration of Vayu Mahabhuta, Asthi Dhatu constituents, which are generally Parthiv and Aapya in nature, went to the appropriate places, where Asthi Dhatu formation is taking place. Asthyagni is responsible for Digestion and transformation of those constituents. By the Chaltav Guna of Vata, the ingredient reaches to places, where they required in the body and form Asthi Dhatu. And Aap Mahabhuta will affix these ingredients. The Function of Aakash Mahabhoot is to provide essential space (existence of subl4e Pores) in Asthi Dhatu. It is already clear that every Dhatu has its own fire. After action of this Dhatu specific Agni on this Aahar Ras particular Dhatu is Formed. Vata’s association with Dhatwagni is very essentially. Even for the manufacture of bone Asthi Dhatu, it has its own specific ‘Agni’ and ‘Vayu’. The fire of the bone, i.e ‘Asthyagni’ reside in its own component, become active at necessity. Asthyagni’s main Panchmahabhoutik constituent is Parthiv but its “Agnidharma” by nature. There are three main Functions of Asthyagni

1. Formation of Swa Dhatu i.e Asthi Dhatu
2. Formation of Majja-Prasadansh
3. Formation of Asthi Kitta

So, Asthyagni has a significant role in metabolism and nourishment of Asthi Dhatu.
Table No. 1.2.1

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This table explains number of bones mentioned by Acharya Charak, Acharya Sushrut and Vaghbha. And this is also a comparison with number of bones described in modern text.

REFERENCES