



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 Dharanm* (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 *Ashti 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 $Ca_{10}(PO_4)(OH)_2$ 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 Nirukti 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 Utpatti:

Asthi is produced during *garbhavस्था* (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*, & *Shmashru*), *Updhatu* (*Danta*) 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 *Prithvi Maha Bhuta* *Asthi Dhatu* has *Sthira* (Stability), *Kathin* (Hardness) and *Kharatva Guna*, because of the *Vayu Asthi* has *Ruksha*, *Saushirya* (Porosity) *Guna*, and *Agni Maha Bhuta* is responsible for the conversion of *Snigdha*, *Slakshna Medo Dhatu* into *Khura*, *Kathin*, *Asthi Dhaut* (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 *Jaghan* (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 ‘*Snayu*’ 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 *Sharangadhara* 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 Keshha* (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*:-

Upadhatus of *Asthi Dhatu* has not described by *Acharya Charka* and *Shushruta*. Only *Acharya Sharangdhara* has mentioned the *Updhatus* of *Asthi*. According to *Acharya Sharangdhara*, *Danta* (teeth) are *Upadhatus* means the Secondary tissue of *Asthi*.(20)

6. *Dhatwagni/Dhatu Paka*

According to *Acharya Charaka*, *Annarasa* 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 *Poshaka* 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*. *Dhatuvaha Srotas* are seven in number: *Rasavaha Srotas*, *Raktavaha Srotas*, *Masavaha Srotas*, *Medovaha 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. *Sihula* 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*, *Samshru*, *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 subtle 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 *Dhatvagni* 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*.

Figures and Tables

Table No. 1.2.1

Sr.No.	Name of <i>Samhita</i>	No. of <i>Asthi</i>
1.	<i>Charak Samahita</i>	360
2.	<i>Sushruta Samhita</i>	300
3.	<i>Astang Hridaya</i>	360
4.	Moderen Science	206

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

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