

## PHYSIOLOGICAL ASPECTS OF ASTHIDHATU

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## ABSTRACT

*Ayurveda* is an ancient medical science which is related to health. *Ayurveda* described three basic physiological constitution of the body they are: *Dosha*, *Dhatu* and *mala*. *Dhatu* are structural unit of the body. *Asthi* is fifth *dhatu* among *saptadhatu*. In modern science *asthidhatu* relate with bones and cartilage. Bones store minerals such as calcium. Metabolic bone diseases are caused by minerals and vitamins deficiency. *Asthidhatu* is resultant of action of *medoagni* on *medodhatu* and is responsible for nourishing *majjadhatu*. It supports the basic structures, protect vital organs, nourishing the nervous tissue. Health refers to the moderate quantity of *asthidhatu* while disorders may develop when any vitiation occur. Just as *asthi dhatu* (Bones) contribute to health, diseases related to bones can disrupt the body. This paper attempts to understand concepts of *Asthidhatu* for maintain health and prevention from diseases related to the bone.

**Keywords:** Health, *Asthidhatu ksaya-Vruddhi*, functions

## INTRODUCTION

*Asthidhatu* is an important *dhatu* among many other *dhatu*s of the body. *Keekas* and *kulya* are synonyms of *asthi* –*Amarkosh*. Just as tree stand with the help

of inner hard core of *sara*, in the same way human also stands with the help of the inner hard core called *asthi*<sup>1</sup>. It mainly involved in providing the shape of

body and protecting vital organs from external shock. *Sharir dharan* is main function of *asthidhatu*<sup>2</sup>. The balance of *asthidhatu* helps in maintains the health in individual whereas any disturb in the function of *asthidhatu* leads to disease. Consumption of various *nidaan* can lead to disturbance in *asthidhatu* in the form of *vrudhhi* and *ksaya*, which further gives rise to many other bone diseases.

#### Origin of Asthidhatu

*Asthidhatu* originated in intra- uterine life further like other *dhatu* it gets nourishment and growth by *Aahar rasa*. Part of *medodhatu* reaches next *srotas* which is *asthivaha srotas*; it participates in the production of *asthidhatu*. *Asthidhatvagni* acts on the nutrients coming from *aahar rasa* and *medovaha srotas* and give rise to *Asthidhatu* proper. By the action of *ushma* present in *meda* itself and *mahabhoot* (*Prithivi*, *Vayu* and *Agni*) this bringing hardness to it and produce *asthidhatu*. To produce hard bone from fluidly and unctuous quality of *medodhatu*, *Vayu* is needed to dry fluid, *Prithivi* is needed for solidity and *Agni* is needed for bring down *Khara* property.<sup>3</sup>

#### Panchbhautik Constitution of Asthidhatu

Although every substance is made up of *pachmahabhoot* these are *Aakash*, *Vayu*, *Agni*, *Jal* and *prithivi*. In *Asthidhatu*, there are *prithivi*, *vayu* and *Agni mahabhoot* are dominant. Because of this *asthidhatu* have qualities of these *mahabhoot*. Due to *prithivi mahabhoot* *asthi* is heavy. Dryness in *asthi* is caused by *vayu* and the roughness is found in *asthi* due to *agni mahabhoot*.<sup>4</sup> Thus, these *mahabhoot* gives roughness, toughness, dryness and hardness to the *asthi*.

#### Location of Asthidhatu, Asthivaha srotas

Since it is one of the seven *dhatuvah*, it must be present throughout the body. It may be present in large quantities in some places and may act exclusively in the context of certain organs. Such places are the places of the *dhatu*s. Location of *asthidhatu* is in its *srotas* that is called *asthivaha srotas*. *Acharya charak* has discussed about *asthivaha srotas*, whereas *sushruta* has not described it. According to *charak*, *mulasthanas* of *asthivaha srotas* are principal organs they are *meda* and *jaghana*.<sup>5</sup> *Chakrapani* said that

*srotas mula* is origin place so that origin of *asthi* has been considered from *meda* and *jaghana*. Excessive exercise, excessive stretching, trauma or excessive intake of *Vata prakopaka Aahar* and *Vihar* can lead to *Asthivaha Srotas Dusti*.<sup>6</sup>

#### Total number of Asthi

*Carak samhita*<sup>7</sup> – 360

*Sushruta samhita*<sup>8</sup> - 300

*Astanga hridaya*<sup>9</sup> - 360

Modern science – 206

#### Types of Asthidhatu<sup>10</sup>

1. *Kapala* – These are flat bone, present in *janu*, *Nitamba*, *Amsa*, *Ganda*, *Talu*, *Shankha*, *Sira*.
2. *Ruchaka* – Teeth are considered as *ruchakasthi* and are utilized to chew food.
3. *Taruna* – These are soft bone and not fully ossified. They present in *Ghrana*, *Karna*, *Greeva*, *Akshikuta*.
4. *Valaya* – They are round. *Asthi* of *Uru*, *Parshva*, *Prustha* are *valayasthi*.
5. *Nalaka* – All bones present in human body are *nalakasthi* except above mentioned.

#### Poshan of Asthidhatu

When the action of *asthiagni* take place on the part of *meda* which form *asthi* in *asthivaha srotas*. Then *asthi* is produced in the *Prasad bhaga*. Bone building constituents present in *aahar rasa*. On the adoption of selective discrimination, quality like bone can absorb so that *asthidhatu* continues to be nourished.

#### Time taken in formation of Asthidhatu

According to *Sushruta Asthi* gets nourishment on the 20<sup>th</sup> day because *Aahar rasa* in every *dhatu* lasts for 3015 *kala*<sup>11</sup>. *Parashara* said that on 6<sup>th</sup> day *asthi* gets nourishment. *Acharya charak* mentioned that process of nutrition of all *dhatu* take place in continuous manner so that the fixed time of nutrition for each *dhatu* cannot be estimated.<sup>12</sup>

#### Asthidharakala<sup>13</sup>

*Purishadhara Kala* is the membrane that holds *asthiagni* and it is 5th *Kala* which exists in large intestine (*pakwashaya*). *Pakwashaya* (Large intestine) and *asthi* are home site of *vata dosha*. When any deformity like gas, constipation occurs in large intestine this deformity transferred to the bones that are more po-

rous and filled with air. It can be related with case of osteoporosis. This relation suggests bone susceptibility to *vata* disorders. So that condition of *Vridhhi* and *kshaya* of *Vata* and *Purisha* affects all sites of *Vata*, especially *Asthi Dhatu*. Hence *Purishadhara Kala* is also known as *Asthidhara Kala*.

### Physical and chemical property of Asthidhatu (Guna)

Main quality of *asthidhatu* is roughness. It is hard, tough, porous and powerful *dhatu* which gives support to entire body.<sup>14</sup> Bones give Strength, resistance to compression, protect internal organs and motion due to muscles contraction, self-repair, site of hematopoiesis. 60% inorganic material formed by carbonate whereas 25% organic part mainly composed of type 1 collagen and other growth factors. 15 % water present in bones.<sup>15</sup>

### Functions of Asthidhatu

- *Asthidhatu* is responsible for proper posture of the body, and it also nourishes *majja dhatu*.<sup>16</sup>
- Function of *asthidhatu* is *dharana* to the living body.<sup>17</sup>
- Bones are the basic structure of the human body and provide strength to the body.
- Just as the inner part of tree called *sara* holds the tree to upright so that human stay upright due to *asthidhatu*.
- Bones do not get destroyed even after the skin and soft tissue since they are *sara*. Muscles, *sira*, *snayu* and other structures are remaining in the body only with the help of bones because *asthi* get tightly bound by these structures and they keep body upright without deteriorating or falling off.<sup>18</sup>

### Upadhatu of Asthidhatu

According to *Sarandhar samhita* teeth are *updhatu* of *asthidhatu*.<sup>19</sup>

### Mala of Asthidhatu

According to *charak samhita* and *sushrut samhita*, nails and *loma* (body hair) are *mala* of *asthidhatu*.<sup>20</sup>

### Characteristic of Asthisara individual

- **Physical features-** *Asthisara purush* has large and stout *Parsni* (Heel), *Gulf* (ankle), *janu* (knee), *Artni* (forearm), scapula, chin, head,

joints of finger, bone, nails and teeth.<sup>21</sup> Huge head, shoulder, tooth, chin, nails and bones are characteristic of *asthisara individual*.<sup>22</sup> Here huge means measure of these organs more than *anguli praman*.

- **Mental traits-** *Asthisara purush* are very enthusiastic, active, bear strain, have excellent and durable bodies and live for long.

### Features of Asthivruddhi

Due to increase in *asthidhatu* causes overgrowth of bones and extra teeth.<sup>23</sup> *Dalhan* adds increase hair on the head, body hairs, and nails also.

### Feature of Asthiksaya

Due to diminution of *asthidhatu*; hair, nails, hair of beard including mustaches and teeth fall off. There is tiredness in the body and looseness of joints occurs.<sup>24</sup> The reason behind it bone become thinner due to *asthiksaya* so that the joints do not fit completely and joint become loose. There is pain in the bone, breaking of teeth and nails, dryness in body.<sup>25</sup> According to *Dalhan* teeth and nails also decay and along with its dryness entire body becomes dry. This shows relation between *asthi* and *vayu*.

***Asthi Pradoshaja Vikara*** (diseases caused by vitiated bone tissue)

*Adhyasthi* (hypertrophy of the bones) *Adhi danta* (excess teeth) *Dantabheda* (cracking sensation in the teeth) *Asthibheda*, *Shoola* crackling sensation and pain in bone. *Vivarnata*, *Kesa*, *Loma*, *Nakha*, *Smashru dosha*, *Kunakha*, *Asthi toda*. There is a condition known as Osteoporosis which means porous bones or brittleness of the bones due to loss of bone tissue leading to increased risk of fractures. Abnormal growths of bone this condition can be related with Hyperostosis, Osteopetrosis, Calcaneal spur, Diaphyseal aclasis.

### Relation between Vata dosha and Asthidhatu

All *Acharya* described bone as the place of *vata* that is why *vata* diseases often occur in the bones. When there is an increase or decrease of *Pitta* or *Kapha* there is also an increase or decrease of tissues and waste products associated with them. For example, if *Pitta* increases or decrease then sweat and blood also increase or decrease respectively except *Vata Dosa*

and *Asthidhatu*. This relationship helps to find both the cause and treatment of disease.<sup>26</sup>

## CONCLUSION

Health is defined by comparison of physiological parameters. The balance of *dhatu* which is called *dhatu-samyak* is one of the important parameters of a healthy person. From birth to death structure of *asthi* remains unchanged because of its dominance in *prithivi mahabhoot*. *Asthi* protect vital organs like heart by thoracic bone, brain by skull etc. Major role of bone is movement of body and give strength with the help of muscles. Excessive exercise, running, late night sleeping, carrying heavy loads, taking food with pungent and bitter, light, *ruksha aahar* are the reason of vitiation of *vata* and cause of bone disease. Disease and cause related to bone can be determined by *Asraya* and *Asrayi* relationship and that will also help in treatment.

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