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### RESEARCH ARTICLE

#### INFLUENTIAL FACTORS FOR THE NORMALCY AND DEFORMITIES OF ASTHI

Dr. Shilpa D. Girme<sup>1</sup>, Dr. Madhuri P. Bhide<sup>2</sup> and Dr. Vasudha Asutkar<sup>3</sup>

1. M.D. (Ayurved) Scholar, Bharati Vidyapeeth College of Ayurved.
2. M.D., Ph.D. (Ayurved), Professor, Bharati Vidyapeeth College of Ayurved.
3. M.D., Ph.D. (Ayurved), Assistant Professor, Bharati Vidyapeeth College of Ayurved.

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#### Abstract

According to Ayurved, those who have healthy bones and skeletal system are known as “Asthi sara-purusha”. These individuals have strong bones, teeth and nails. Also they are very strong, active and enthusiastic. Asthi gives the firmness and stability to body and mind. But there are individuals with unhealthy bones also. Recently, bone disorders have become one of the imperative health issues worldwide. Due to the changing lifestyle, eating habits, daily regimen and sedentary work, the number of people being affected has been increasing. Bone disorder is the most common cause of pain and prolonged disability in patients. Bones are the main structure that hold the body and give a definite shape to every individual. But if this skeletal structure has deformity it surely affects the day-to-day activities as well as social being. Bone disorders are more common and also difficult to treat in geriatric, pediatric, weak patients, under-nourished and vatarugna. So, modification in diet and regimen can prevent or delay early degenerative changes in bone. For this sake, it is necessary to study the influential factors for the status of health of Asthi.

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#### Introduction:-

Bones are the main structure that hold the body and give a definite shape to every individual. But if this skeletal structure has deformity it surely affects the day-to-day activities as well as social being. Due to the changing lifestyle, eating habits, daily regimen and sedentary work, the number of people being affected due to bone disorders has been increasing. Recently, bone disorders have become one of the imperative health issues worldwide. Minerals like Calcium, phosphorous, magnesium along with protein and collagen help to build bones. Vitamin D is needed to make bones strong. Hormonal imbalance, increased intake of proteins, salt and stimulants interrupt bone building. Stress and prescription drugs also disrupt the process of bone building. Deficiency of nutrients leads to osteoporosis, inflammation of joints (arthritis) and painful joints.

According to Ayurveda, those who have healthy bones and skeletal system are known as “Asthi sara-purusha”. These individuals have strong bones, teeth and nails. Also they are very strong, active and enthusiastic<sup>[1]</sup>. Asthi gives the firmness and stability to body and mind. But there are individuals with unhealthy bones also. Bone disorder is the most common cause of pain and prolonged disability in patients. Bone disorders are more common and also difficult to treat in geriatric, pediatric, weak patients, under-nourished and vatarugna. So, modification in diet and

**Corresponding Author:-Dr. Shilpa D. Girme**

Address:-M.D. (Ayurved) Scholar, Bharati Vidyapeeth College of Ayurved.

regimen can prevent or delay early degenerative changes in bone. After reading between the lines from the texts, various factors that influence the health of Asthi were found. These are not specially mentioned in asthi-vahasrotas dushti hetubut are seen in vyadhisampraptisof Asthi-vikrutiis, either textually or practically. These factors are: -

1. Tridosha
2. Rakta Dushti
3. Meda-DhatuVruddhiand Saamta
4. Ahara/Rasa-Asthi relation.
5. Regular exercise
6. Normalcy of Agni
7. Healthy lifestyle
8. AsthiSarata
9. Congenital factors
10. Heredity

These factors are illustrated here.

### **Tridosha:**

#### **Vata:**

According to Vata-asthiashrya-ashrayiSambandh<sup>[2]</sup>, vata resides in asthi while pitta resides in rakta, sweda and kapha resides in the remaining dhatu, upadhatu and mala. Usually dravya that cause vruddhi in ashrya causes vruddhi of ashrya and vice-a-versa and same goes with kshay but it's exactly opposite in case of vata and asthi. Vatavrudhi causes asthi-kshay and vatashaman causes asthivruddhi. This is why asthi becomes weak in vruddhawastha, as it is vatapradhan stage of life.

Prakupitvata increases rukshata, laghuta and kharatva in asthi so even the asthi becomes more porous, losses its compactness and leads to breaking of bone into osteophytes. Due to increase in vayumahabhuta, there is decrease in itsparthivatva. Similarly if there is vata-kshay, it leads to decrease in gunasvayumahabhuta and increase in the parthivgunas. So when there is vata-kshay, asthi becomes excess guru, sthira and kathina. Therefore, anything in excess is harmful and it is of pronounced importance to maintain prakrutavata-awastha to have healthy bone condition.

#### **Pitta:**

Prakupit pitta causesharita or haridra like vaivarnya on danta, nakha and can cause hair fall and greying of hair by increased ushma. If prakupit pitta becomes asthyashita, it causes daha<sup>[3]</sup>.

#### **Kapha:**

Prakupit kapha causes shubrata, drudhta and guruta of asthi, nakha and danta. It increases the thickness of bones and teeth. Although these qualities are expected in Asthi but anything in excess is an ailment. When Prakupit kapha becomes asthyashrita, it causes stabdhata of asthi<sup>[4]</sup>.

Normalcy of all the tri-Dosha is always favorable for any individual.

#### **Rakta Dushti:**

'Jeevan' is the function of Rakta<sup>[5]</sup> so if it is vitiated, the poshakansha reaching the further dhatus like asthi will also be vitiated. This will certainly lead to formation of Asthi vikruti or vikruti in already present asthi. In asthi-vikrutiis like sandhibhagna, asthishosha, asthi-gata vidradhiandasthibhagna (nija), rakta dushti plays an important role.

In bhagnachikitsa, it is stated that whenever there is pakwa-awasthaofvrana, it is associated with pitta-prakopa and rakta-dushti. To avoid fracture from becoming kruchhra-sadhya, bhagnapachan should be avoided.

Asthidradhi is explained as-'the Kupita dosha causesdushti in twak, rakta,mamsa and meda and get seated in asthi'. Asthidradhicauses severe inflammation and pain. Asthidradhi is elaborated by Sushrutacharya, it says that the paka of majja within the asthi leads to pus formation<sup>[6]</sup> and when this pus is obstructed by asthi and mamsa, the patient feels burning sensation within. This ushma formed due to majja-paka destroys the asthi like an object is destroyed by burning. Again here we come to conclusion that pus formation has led to asthidradhi and any pus formation is due to rakta dushti.

Trauma leads to vata, rakta and mamsa-dushti. Kotha is the putibhava i.e. necrosis<sup>[7]</sup>. So even in kotha, the role of rakta is significant. Kotha is either wet (Pus formation) or dry (Necrosis). If there is pus formation, it's probably due to the vitiation of kapha-pitta and dry necrosis is due to vitiation of vata-pitta. Prakupit kapha increases the picchilata, sandrata and klinnata while Prakupit vata increases the rukshata, kathinta and kharata, prakupit pitta increases the ushmaat that site and does pachan. Ushma from pitta liquefies the kapha and forms pakawastha while it helps vata to dry up the sneha or apya-bhava from dhatu, mala, sira-snayu-dhamani, etc.

Sushrut has advised bhagna Prasadak taila<sup>[8]</sup> in bhagna for paana, abhyanga, nasya, basti and to consume with food. The contents of this taila are godugdha, kakolyadigana, eladigana, tagar, lodhra, anantmula, shrungatak, yashtimadhu, etc. These dravya are kashay, madhu or tikta, katu, shita, rakta Prasadak and kledanashak.

Priyngwadi and Ambashthadi ganas<sup>[9]</sup> are bhagnasandhankar; its contents are shita-gunatmak, pitta-shamak, rakta-prasadakandvrana-ropak. Nyagrodhadi gana<sup>[10]</sup> is Asthi sandhankar and its contents are shita-kashaygunatmak, Vrana and rakta-pittahar. Basically, dahaghna, vranya, pittahar, rakta-prasadanandbhagnasandhankar all these actions go hand in hand and are supportive to each other. From this, it can be inferred how important it is to have rakta in prakrut-awastha for bones and to cure its fractures.

Wheat (godhuma) is said to be best bruhana and sandhankardravya<sup>[11]</sup> and its properties are swadu and sheeta, which again explains the rakta-prasadakarproperty.

All these references indicate the importance of rakta in asthivikrutiis. Rakta dushti greatly contributes to asthivikrutiis, especially in diseases like bhagna, Kotha and vidradhi.

#### Meda-dhatuvruddhi:

While explaining Sthoulya<sup>[12]</sup>, it is stated that in obese patients only medadhatu (fat) is produced in abundance thus the further dhatu are not well formed. This is certainly acceptable as per 'kedar-kulyanyaya', as medadhatu is formed in excess due to tikshnameda-dhatwagni, the further dhatus do not receive sufficient poshakansha.

The main cause of both obesity and emaciation is rasa) here rasa means 'ahara-rasa', when this rasa is apakwa, it forms 'aam'). Even though the agni is dipta, adhyashan causes accumulation of aam-rasa. While flowing in the entire body, the aam-rasa circulates and deposits everywhere in the body leading to margawrodha. Along with it, because of consumption of specific shleshmalahara only, meda is formed in abundant while rests of the dhatus are formed in small quantity. By 'shesh-dhatu', it means 'asthyadidhatu'. This entire pathology leads to obesity, along with which disease like vata-vikara occur. Margawrodha causes vata-prakopa and leads to vata-vikara. So both saamta and meda-dhatuvruddhi contribute to asthi-vikrutiis. Therefore to maintain good health of bones, saamta should be avoided and weight should be normal.

#### Ahara/Rasa-Asthi relation<sup>[13]</sup>:

Food affects every activity and metabolism of the body. Every rasa is necessary for the body and should be consumed as per the right quantity for each person (मानावत्). Excess consumption of any rasa is inappropriate; it definitely affects the dosha-dhatu-malasangastha and will land up in vikruti. Rasa and their effects on asthi are as follows →

Table 1:-

|               | Properties and actions   | Adverse effects of excess consumption             |
|---------------|--|---|
| <b>Madhur</b> | Sapta Dhatu Vardhak, keshya, Sandhankar  | Medoja Vyadhi, sthoulya                           |
| <b>Katu</b>   | Agni deepan, vranaavasadan, krumi-naasha, bandha-chhedan, stroto-margavishodhan. | Vata prakopa, toda, bhedan.                       |
| <b>Kashay</b> | Sandhankar   | Vata prakopa, stroto-rodha.                       |
| <b>Amla</b>   | Agni deepan.   | Bhagna pachan, danta-harsha-karak, roma-sanvejak. |
| <b>Lavan</b>  | Vatahar, vatanuloman, stroto-margavishodhan.                                     | Danta-patan, khalitya, palitya.                   |
| <b>Tikta</b>  | Agni deepan, kleda-medashoshan.  | Sapta-dhatushosha.                                |

**Madhur Rasa:**

Madhurrasa issnigdha, sheetaand guru gunatmak so it is also pitta-visha-marutghna, keshya, sthairyakar, sandhankar, ayushyaandsapta-dhatuwardhak.Madhurrasa is parthiva and apya Mahabhuta pradhan. Pittaisushnain propertyand sheeta quality of madhura rasa does its shaman. It is also snigha and guru, thus does vatashaman. Madhurrasa is itself balya and ayushya thus is beneficial for all the saptadhatu including asthi. It is beneficial for keshha also, which is an asthimala. Madhurarasa is also sandhankar; therefore it gives binding property to all the body elements. Asthi and asthi-sandhi require the quality of ‘sandhan’ to function.

**Katu Rasa:**

Katu rasa does agnideepan, cleanses vrana, cures krumi, removes bandh (stambdhata) and does marga-shodhan. Katu is agni and vayupradhanrasa, while asthi is also vayu and agnipradhan along with prithvi. This rasa is laghu, ushna and ruksha. So it is used in pathologies where margawrodha, kleda and vrana are seen. But atiyoga of katurasa should be avoided as it can cause vataprakopa, toda (pain), Bheda (breakage of tissues like fracture).

**Kashay Rasa:**

Kashay rasa islaghu, shita, kapha-rakta-pitta shamak as well as sangrahi and ropak. Thus it can be used in infective pathologies. It is sandhankar thus benefits the functions of asthi and its sandhi. Kashayrasa is vayu and prithvipradhan according to charak while sushrut mentions it as prithvi +agnipradhan. Asthi itself is prithvi +vayu + agniPradhan, therefore kashayrasa is beneficial for asthi. But atiyoga of kashayarasa should also be avoided as it can cause vataprakopa, srotasawarodha and major vyadhi like pakshawadha, ardita.

**Amla Rasa:**

Amlarasa does agnideepan, vatanuloman and dhatupreenan. So amlarasa is beneficial in general terms only because it also does raktadushti when taken in atiyoga. And the relation of asthivikrutii with rakta- dushti is already explained. It does vidah and the ushnaguna from rakta-pitta does paka of the asthi. It can also form pus at fracture site by bhagnapachan.

**Lavan Rasa:**

Lavanrasa is guru,snigdha and it is not guru; thus it does vataharkarma. It does vilayan of mala or kledabhava thus does srotasshodhan. Lavan is ruchikar and pachak but in atiyoga, it increases the shaithilya and does vishyandan. It decreases the kathinya of asthi. Dantapatan, khalitya and palityais seen in lavanatiyoga.

**Tikta Rasa:**

Tikta rasa does kleda-medashoshan. Therefore it does srotasshodhan. When srotas are clear, nutrition can properly reach all the dhatus. Simillar principle is used in the application of 'tiktaksheerbasti'. Although tiktarasa does saptadhatushosha, including asthi but Tikta dravya are used to clear the srotasas and ksheer which is madhur and sheeta, provides strength (bala) to asthi.

**Ahara Dravya:****Table 2:**

|  | <b>Properties</b>                |
|--|----------------------------------|
| Milk <sup>[14]</sup>   | Asthi sandhankar, vayasthapana.  |
| Majja <sup>[15]</sup>  | Asthi bala-vruddhikar.           |
| Vasa <sup>[16]</sup>   | Bhagna sandhankar, asthirujahar. |
| Wheat <sup>[17]</sup>  | ] Bhagna sandhankar              |
| Oils <sup>[18]</sup>   |                                  |
| Honey <sup>[19]</sup>  |                                  |
| Garlic <sup>[20]</sup>   |                                  |
| Shaali, mamsa-rasa, milk, ghee, bruhananna-pana, pea-soup. <sup>[21]</sup> | Bhagna Chikitsa.                 |

**Milk (dugdha):**

Milk is sheeta, snigdha, madhur, vata-pitta shamak. It gives strength to the body; it is saptadhatuwardhak and ayushya. It is said to be ‘ajasrikrasayan’ and should be consumed daily. It is satmya to everyone since birth. Also it is asthisandhankar due sheetaguna and virya.

**Majja:**

One of the functions of majja is asthi-puran. Majja is snigdha, sheeta and does bala, virya, rasa, kaphavardhan along with asthivardhana. It is also used for snehana.

**Vasa:**

Vasa is used highly snigdha so can do shaman of excessively prakupitasthigatavata. It is used in asthi-sandhi, sira, snayu, marmaandkoshtha gata maharaja. Asvasa is very snigdha and it'ssnigdha must be penetrating to deeper tissues it is used in the condition where vata is very prakupit and the concern organs are gambhir.

**Wheat (godhuma):**

Godhuma is madhura, sheetaand guru. The madhur, guruguna makes it vatahar and stambhankarma is achieved by sheetaproperty, this makes it asthisandhankar. Here 'sandhankar' term can be inferred as to maintain the compactness of asthi and not just as a treatment of fracture.Godhuma is staple food in many countries; it is consumed on daily basis.

**Tila Taila:**

Tilatailaismadhur, tikta, kashay, tikshna, ushna, bruhan, sara, vikasi, vatahar etc. due to the vikasi and saraguna it can reach deep seated tissues like asthi and it is also guru, bruhan, vatahar so it nourishes the Asthi. Therefore it is used in various types of asthibhagna.

**Honey (Madhu Varga):**

Similarly like tilataila as explained above, madhu is also a combination of madhurrasa and kashayanurasa, sheeta so it is sandhankar and ropak.

**Garlic (rason):**

Rasonis sara so it can reach deeper tissues of asthi and it is also snigdha, ushna, guru and madhur so does vatashaman. It is also balya. Thus rasonmaintains the compactness of asthi and heals fractures.

**Recommended food in treatment of fractures (bhagnachikitsa):**

Recommended food in treatment of fractures (bhagnachikitsa by Sushruta) is shali, mamsarasa, ksheer, ghruta, bruhananna-panaand satin yusha. Overall bruhandravya are used in diet while treating asthibhagna. Mamsarasa and ghruta are also agnivardhak thus improves the metabolism. 'satin-yusha' is specifically advised. It is vatanulomak and acts on purishvahasrotas as laxative. Hence vatashaman is done which is again beneficial for asthi.

**Regular exercise:**

Exercise should be done regularly unless contraindicated for certain health issues. The right quantity of exercise is 'अर्धशक्ति' i.e. 'until ones half the strength capacity'. Regular exercise enhances lightness to the body, increases the ability to do hard work, normalizes agni, depletion of excess fat and develops stable physique. Exercise increases ones physical and mental strength to endure hardships. It also normalizes the basic metabolism of the body.

**Normalcy of Agni:**

Jatharagni is important for transformation of food into ahara rasaand then dhatwagni transforms it into the respective dhatu. Dhatu are not properly formed when agni is manda and the corresponding dhatumala is excessively formed. Similarly in this case, Asthi is not well nourished butkeshha and nakha are abundantly formed.

**Healthy lifestyle (swasthavrittapanan):**

Healthy eating has always been advised to maintain healthy dosha-dhatu-mala andindriya-mana-satva, this includes non-sedentary, active lifestyle, regular and healthy eating habitslike no gramyahara, noparyushitahara, no bakery products. Timely, quality and appropriate amount of food should be consumed. Neither dry or oil free food, nor oily and deep fried foods like junk food should be consumed. The routine should include regular exercise in spite of their routine jobs.

**AsthiSarata:**

Examination of dhatus is done with the help sarata of the corresponding dhatu. For examination of asthisarata, the criteria are maha-shira-skandha(normally broad or huge head and shoulders) and drudhadanta-hanvyasthi-

nakha<sup>[22]</sup>(compact and firm teeth, chin and nails). Dhatusarata is not permanent or unchangeable, unlike prakruti. Dhatusarata can be developed with the help of corresponding dhatu-poshakaharaand aushadhi. With consumption of proper diet like milk, etc., normalcy of asthi can be maintained and Asthi can be sara.

#### **Congenital factors:**

Formation of anga-pratyanga or shakha begins in the third month of garbhawastha. Foetus is dependent on the mother in the intra-uterine life so her ahara-viharamatters a lot in the development of the foetus. The garbha receives its poshan from the mother through rasa-vahi naabhi-naadi<sup>[23]</sup>. If the right diet is provided, it gives nourishment to the mother as well as the foetus and helps growth and development. But if the mother's ahara-vihara is disturbed, it can lead to malnourishment and ill-formed anga-avayva of the garbha.

There are references in bruhatrayee stating that if garbhini's daurhuds(desires) are not valued & provided, child might be kubja, kuni, khanja, jada, vaman, vikrit or absence of vision<sup>[24]</sup>. If the daurhudini's sprarthna (desires) are not fulfilled, the vayu gets prakupit and does vicharan in sharir leading to garbhavinasha or vairupya<sup>[25]</sup>. Also asthi is a pitrujaBhava<sup>[26]</sup>, so bija-dushti (especially shukra-dushti) is also responsible for deformities of the pitrujabhava like asthi, nakha, danta and kesha.

#### **Heredity:**

One more important factor is also heredity. Asthi, nakha, dantaandkeshaarepitrujabhava. When the asthi is good but there are no responsible factors found, heredity can be considered. Or it can also be a combination of healthy lifestyle (ahara-vihara) and heredity.

#### **Conclusion:-**

These ten factors should be considered while one desires healthy, strong bones and to find the actual causes of bone deformities. These factors conclude all the possible influential factors for bone. To treat a disease, it is of utmost importance to firstly find the cause of that disease and then to understand its pathogenesis. Therefore whenever we come across any bone disorder, as an ayurvedic practitioner, we must rule out and treat these hetus of bone disorders.

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