



A REVIEW ARTICLE ON ETIOPATHOGENESIS OF ASTHIKSHAYA.

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ABSTRACT

World Health Organization defines osteoporosis as a "Progressive systemic skeletal disease characterized by low bone mass and micro architectural deterioration of bone tissue, with a consequent increase in bone fragility and susceptibility to fracture" Osteoporosis is considered a serious public health concern. Based on 2001 census approximately 163 million Indians are above the age of 50. This number is expected to increase to 230 million by 2015. Even conservative estimated suggest that of these, 20% of women and about 10-15% of men would be osteoporotic. The total effected population would, therefore, be around 25million, the figure can increase to 50 million. According to the classics, *Asthi Kshaya* is having the *Lakshanas* like *Asthi Shulam*, *Kesha*, *Loma*, *Nakha*, *Dwija Prapatanam*, *Sandhi Shaitilya*. As some of the *Lakshana* of *Asthi Kshaya* resembles with the signs and symptoms of Osteoporosis, to certain extent it can be compared to Osteoporosis. The detail knowledge of *Nidana Panchak* of *Asthikshaya* will help in its diagnosis and management.

KEYWORDS: *Asthikshaya*, *Vata Dosha*, *Osteoporosis*, *Nidan Panchak*.

INTRODUCTION

Ayurveda is an ancient science of life deals with the preventive as well as curative aspect. It explains human body as a 'congenial homeostasis' of *Dosha*, *Dhatu* and *Mala*. The function of *Dhatu* is *Dharana* of the *Sharira*.^[1] Osteoporosis is one of the major signs that has increasingly been perceived as serious disabling disease in old age men and women aged above 40 years reaching *Rajonivritti*. It is not mentioned as disease in classical texts of *Ayurveda*. Yet, according to *Sushrut* it can be considered under *Swabhavabala Pravritta Vyadhi*.^[2] In *Praudhawastha* and *Jaravastha*, where *Vata* starts overpowering *Pitta Dosha* and leads to *Kshaya* of all *Dhatu*s.^[3] According to the principles of *Ashraya-Ashrayi Bhava* by *Vagbhat*^[4] *Asthi Dhatu* is the seat of *Vata Dosha*^[5] and is inversely related to each other i.e., if there is *Vata Vruddhi* there is *Asthikshaya*. *Asthikshaya* occurs due to two main mechanisms, the first is deficiency of nutrients suitable for nourishing the bone because of malnutrition or the catabolic activity of *Vata Dosha* and the second is *Strotoavarodha* which obstructs supply of nutrition to the *Asthivaha-strotas* as a result of imbalanced *Agni* i.e., with *Jatharagnimandhaya* and

Dhatwagnimandhaya that leads to formation of *Ama*. It can also occur due to a combination of both.

World Health Organization defines Osteoporosis as "Progressive systemic skeletal disease characterized by low bone mass and micro architectural deterioration of bone tissue, with a consequent increase in bone fragility and susceptibility to fracture".^[6] Low levels of Estrogen cause imbalance in bone reabsorption and remodelling which leads to accelerated bone loss.^[7] Though most of the *Samhita* explained about *Asthi Dhatu*, its structure, function and its various diseases, Detail description about *Nidana Panchak* of *Asthikshaya* is not available in our classics. Considering the above factors in this present study, an effort is made to understand the *Nidana Panchak* of *Asthikshaya*.

AIMS AND OBJECTIVES

To compile, study and evaluate the concept of *Nidan Panchak* of *Asthikshaya* from the available classical literature, commentaries, research works, articles on internet and available information in allied basic science.

MATERIAL AND METHODS

This article is based on a review of various Ayurveda classical literatures. Materials related to *Asthi Kshaya*, were collected as well as references were compiled, analysed and discussed for a thorough and in-depth understanding of the concept of *Nidan Panchak* of *Asthi Kshaya*.

NIDANA

Samanya Dhatukshaya Nidana^[8]

- *Ativyayama* (excessive exercise)
- *Anashana* (fasting)
- *Ati Chinta* (worry)
- *Ruksha-Ashana* (intake of dry food)
- *Alpa-Ashana* (intake of less food)
- *Vata-Atapa Sevana* (exposure to dust and sunlight)
- *Bhaya, Shoka* (excess of worry, grief, fear,)
- *Ruksha-Pana* (intake of dry liquid like *Ruksha Madya*)
- *Prajagara* (waking at nights)
- *Ativartana* (*Atyadhika Pravrutti*) of *Kapha, Rakta, Shukra, Mala,*
- *Kala* (time factor (*Adana Kala* and *Vridhavasta*))
- *Bhutopaghata* (invasion of *Bhuta, Preta* etc.)

Asthivaha Strotodushti Nidana

- *Vyayama* (excessive exercise)
- *Ati Sankshobha* (excessive irritation)
- *Asthi Vighattana* (repeated trauma)
- *Vatala Ahara Sevana* (excessive consumption of *Vata* aggravating food)

Majjavahasrotodushti Nidana^[9]

- *Utpeshana* (being crushed)
- *Ati Abhishyandana* (being filled with wet components of *Kapha*)
- *Abhighata* (trauma)
- *Prapedana* (compressed)
- *Virudha Ahara Sevana* (consumption of incompatible and unwholesome food)

Purishava Srotodushti Nidana^[10]

- *Sandharana* (withholding urge of defecation)
- *Ati Ashana* (excessive eating)
- *Ajeerna* (indigestion)
- *Adhyashana* (repeated eating)
- *Durbalagni* (weak digestion)
- *Krusha* (in emaciated persons)

Medovaha Strotodushti Nidana

- *Avyayama* (lack of exercise)
- *Diva Swapna* (sleeping during day time)
- *Medhyanam Ati Sevanat* (excessive intake of fatty, fried and caloric foods)
- *Varuni* (an alcoholic product).

Vishishta Nidana

Sahaja Nidana

- *Beeja*,^[11] *Beejabhaga, Beejabhagavayava*
- *Pitrija Bhava*^[12]
- *Kulaja* (Caucasians)
- *Prakriti* (*Vata* dominant *Prakriti*)

Jataja Nidana^[13]: *Vatakara Ahara, Vihara*

Swabhavaja Nidana^{[14][15]}: more in women and old age

Samprapti

Acharayas have mentioned about the *Ashraya-Ashrayi Bhava* which beautifully explains the relationship of various *Doshas* with the *Dhatu*. As per this theory *Vata* is the *Ashrayi of Asthi Dhatu* and only these two share a reciprocally proportional relationship. Owing to this peculiar relationship, all *Vata Nidana* becomes the *Nidana* for *Asthi Kshaya*. Keeping in mind all the *Nidanas* explained under *Vata Vyadhi* an attempt has been made here to formulate and explain the *Samprapti* of *Asthi Kshaya*. In order to have a proper interpretation of the *Samprapti* of *Asthi Kshaya*, apart from the normal *Vata Prakopa Nidana*, the main factors for the materialization of the disease, *Stroto Pradusaka Nidanas* of *Medovaha, Asthivaha, Majjavaha* and *Purishavaha Strotas* should not be neglected, as they also play a definite role, either directly or indirectly in the pathogenesis of *Asthi Kshaya*. The proper functioning of *Jataragni, Bhutagni, Dhatwagni* is essential for the “*Samyak Dhatu Poshana Prakriya*”^[16] in order to maintain the qualitative and quantitative normalcy of the *Dhatu* while explaining concept of *Dhatu Utpatti*.

Functional deformity in any of these *Agnis* especially the *Dhatwagni* leads to the *Vikruti* in the transformation of *Poshaka Dhatu* (*Dhatu* specific nutrients) into *Poshya or Sthayi Dhatu*, resulting in *Dhatuvikruti*. Hence, adaptation of the principles of *Dhatu Poshana Krama* is also carried out in this regard to explain the *Samprapti* of *Asthi Kshaya*.

Manasika factors also play a vital role in the pathogenesis of *Asthi Kshaya*. The role of *manas* in the causation of a disease is very well explained in our classics. Thus, these factors are also considered to frame up and explain the *Samprapti* of *Asthi Kshaya* effectively. Considering the above said factors it is learnt that the Pathogenic mechanism of *Asthi Kshaya* is not single mechanism whereas it is a complex mechanism.

Samprapti Ghataka of Asthi Kshaya

Dosha: *Vata Pradhana* (*Vyana, Udana, Samana*), *Pitta* (*Pachaka*), *Kapha* (*Kledaka, Shleshaka*) *Vata* is the leading *Dosha*, as this is a disease related to *Jara* and *Asthi Dhatu*. Also, as *Vata* gets provoked *Kapha Kshaya* takes place. *Vata Prakopa* and *Kapha Kshaya* manifests symptoms such as *Shoola, Rukshata, Ruja, Shrama* etc.

Dushya: *Asthi* is main *Dushya* in this disease with its *Mala*, *Nakha* and *Kesha*. but *Kshaya* of all *Dhatu* also occurs in later stage, hence all *Dhatu* including their *Upadhatus* can be considered under *Dushya*.

Agni: In old age, *Jatharagni Vaishamy* leads to poor *Dhatu* formation, by affecting *Dhatvagni* and *Bhutagni*.

Ama: *Jatharagnijanya Ama* and *Dhatvagnijanya Ama*.

Strotas: *Medavaha*, *Asthivaha*, *Majjavaha*, *Purishavaha Strotas*.

Stroto Dushti Lakshana: *Sanga*.

Udbhava Sthana: *Ama Pakwashaya*.

Sanchara Sthana: *Rasayani*.

Vyakta Sthana: *Asthi Dhatu*, its *Upadhatu Danta* and *Mala Kesha*, *Nakha*, *Roma* and *Sandhi*.

Adhithana: *Asthi* and *Sandhi*.

Roga Marga: *Madhyama Roga Marga*.

Roga Prakriti: *Chirakari*.

Purvarupa

As we go through the classics, we cannot find about the *Poorvarupa* of *Asthi* *Kshaya*. *Vatavardhaka Nidana* along with the other *Nidana* itself forms the *Nidana* for the *Asthi* *Kshaya* due to the *Ashraya Ashrayi Bhava* of the *Vata* and *Asthi*. So *Vridhdhava* causes the disease *Asthi* *Kshaya*. As we all know that the *Poorvarupa* in *Vatavyadhi* is *Avyakta*. *Chakrapani* in his commentary has clarified that *Avyakta* can be taken as *Alpavyaktata* or as *Asampoorna Lakshana* or as mild *Lakshana*. So, the *Lakshana* in their mild form can be taken as the *Poorvarupa* of *Asthi* *Kshaya* in the initial stage of the disease. *Manda Vedana* (dull aching type of pain) in the *Asthi*, *Sandhi*, and *Mildness* of other *Lakshana* such as *Kesha*, *Roma*, *Nakha*, *Danta Vikara* (*Shadana* and *Bhanga*) may be taken as the *Purvarupa* of the disease *Asthi* *Kshaya*.

Rupa

- *Asthibheda*

Pathya-Apathya

SN	Varga	Pathya	Apathya
1.	<i>Rasa</i>	<i>Madhura-Amla-Lavana</i>	<i>Katu-Tikta-Kashaya</i>
2.	<i>Shukadhanya</i>	<i>Nava Godhuma, Nava Shali, Rakta Shali, Shashtika Shali</i>	<i>Rajamasha, Nishpava, Mudga, Kalaya</i>
3.	<i>Shimbi Varga</i>	<i>Nava tila, Masha, Kulattha</i>	<i>Truna, Koradusha</i>
4.	<i>Shaka Varga</i>	<i>Patola, Shigru, Vartaka, Lashuna</i>	<i>Jambu, Udambara, Kramuka, Tinduka</i>
5.	<i>Mamsa Varga</i>	<i>Ushtra, Go, Varaha, Mahisha, Mayura, Bheka, Nakula</i>	<i>Shushka Mamsa, Kapota, Paravata</i>
6.	<i>Jala Varga</i>	<i>Ushnajala, Shritasheetajala</i>	<i>Sheetajala</i>
7.	<i>Dugdha Varga</i>	<i>Go, Aja, Dadhi (Svadu Dadhi and Amla Dadhi, curd prepared from buffalo milk), Ghrita, Kilata</i>	-
8.	<i>Mutra Varga</i>	<i>Gomutra</i>	-

- *Asthitoda*
- *Ruja*
- *Asthi Shula*
- *Kesha Vikara and Patina*
- *Loma/Roma Vikara and Patana*
- *Nakha Vikara and Patana*
- *Smashru Vikara and Patana*
- *Danta Vikara and Patana*
- *Shrama*
- *Sandhi shaitilya*

Upashaya

1. *Madhura Rasa Pradhana Dravya* like *Shali, Rakta Shali, Masha* etc.
2. *Amla and Lavana Rasa Pradhana Dravya*.
3. *Dugdha, Dadhi, Takra* and *Ghrta*.
4. *Mamsa, Mamsa Rasa* etc.
5. *Niyamita Vyayama*.
6. *Abhyanga* and *Swedana*.
7. *Vata Nashaka* and *Vedana Shamaka Aushadhi*.

Anupashaya

1. *Shushka Shaka, Mamsa, Mudga, Masura, Adhaki, Kalaya* etc.
2. *Madya*.
3. *Ati Vyayama, Sahasa* etc.

Sadhyasadyata

Asthi is *Gambhira Dhatu* i.e., deeply situated. The disease of *Gambhira Dhatu* is said to be *Yapya* or *Kashta Sadhya*.^[17] The disease *Asthi* *Kshaya* is *Asadhya* because of its occurrence in *Jarawastha*. Also, when the disease *Asthi* *Kshaya* is manifested, in condition of *bhedawastha* i.e., last stage of *Kriya Kala*. Where as long as the disease is treated, it is *Yapya* and if not treated, the disease becomes *Asadhya*.^[18]

Upadrava

if the disease is not treated properly it can lead to *Kshaya* of other *Dhatu* such as *Majja Kshaya, Shukra Kshaya* and other *Dhatu Kshaya* leading to *Bala* and *Oja Kshaya*. Due to the *Kshaya* of *Asthi Dhatu*, it loses its normal texture, strength and density leading to *Asthi Bhagna* (fractures) which are the commonest *Upadrava* of *Asthi Kshaya*. Modern science also agrees that the fractures are the major risk factors of Osteoporosis.

9.	Madhya Varga	Dhanyamla, Sura	-
10.	Sneha Varga	Tilaja, Ghrita, Vasa, Majja	-
11.	Vihara	Veshtana, Trasana, Mardana, Snana	Ratri Jagarana, Ativyayama, Adhika Shrama, Ativyavaya, Ati Chankramana, Vegadharana
12.	Manasika	Sukha	Atichinta, Atibhaya, Atishoka

DISCUSSION

Nidana

In classics there is no direct mentioning about the *Asthikshaya Nidana* or the factors that cause *Asthi-Kshaya*. But the relationship between *Asthi Dhatu* and *Vatadosha* is beautifully explained through *Ashrayaashrayi Bhava* mentioned in our classics. According to this rationale, when *Vata* increases, *Asthikshaya* occurs and vice versa. Keeping this particular concept in mind we can say that the *Nidana* responsible for the increase of *Vata Dosha* is responsible for the *Asthi Kshaya*. *Akalaja Jara (Rajonivritti)*, *Ruksha Ahara Sevana* for lifetime, sedentary life style, and low intake of *Asthi Poshaka Amsha* in diet serves as *Nidana* of *Asthi Kshaya*. Apart from this, factors like *Manasika Nidana*, *Stroto Dushti Nidana* of *Medovaha*, *Asthivaha*, *Majja Vaha* and *Purisha Vaha Strotas* and also the factors that affects *Jatharagni*, *Bhutagnis*, especially *Parthivagni*, *Vayuvyagni* and *Tejasagni* and both *Upachayakaraka* and *Apachayakaraka Asthi Dhatvagnis* are also responsible for *Asthi Kshaya*.

Functional deformity in any of these *Agnis* especially the *Dhatwagni* leads to the *Vikrti* in the transformation of *Poshaka Dhatu* into *Poshya* or *Sthayi Dhatu*, resulting in *Dhatuvikrti*. Hence adaptation of the principles of *Dhatu Poshana Krama* is also carried out in this regard to explain the *Samprapti* of *Asthikshaya*.

Discussion on Samprapti

Samprapti of *Asthikshaya* is not a single pathogenic mechanism, whereas it is a complex mechanism. Hence the *Samprapti* of *Asthi Kshaya* is explained under two different headings *Samanya Samprapti* and *Vishesha Samprapti*. According to *Acharya Charak*, *Avruta Marga* of *Vata* causes it to become *Prakupita* and causes *Rasadi Dhatu Shoshana*. Obstruction of normal *Gati* of *Vata (Vyana Vata)* occurs due to the *Margavarana*. By this the *Ahara Rasa Viksepa (Rasa Samvahana)*, *Dhatu Vyuhana* and *Agni Samirana* functions of *Vyana Vata* are affected. As a result of this, the *Ahara Rasa* containing the *Poshak Amshas* to the *Dhatu* will not be able to reach and nourish the *Sthayi Dhatu*, *Dhatu Vyuhana* i.e., specific arrangement and permeability of the *Poshak Amshas* inside the *Sthayi Dhatu* will not be possible and the functions of the *Dhatvagnis* are also affected. This signifies the importance of *Medodhatvagni*. Vitamin D, which is derived from sterols, is essential for absorption of calcium in the body. Hence the *Moola* of *Asthi Vaha Strotas* is rightly considered as *Meda*. Imbalance in *Asthi Dhatvagni* leads to improper formation of *Sthayi Asthi Dhatu* from *Poshaka Asthi Dhatu*. Parathyroid hormone, calcitonin, estrogen etc. play significant role in

metabolism of bone. These all can be classified under types of *Agni* acting at different levels. The *Ashrayashraayi* relationship of *Vata Dosha* and *Asthi Dhatu* forms a fundamental base to understand any pathological condition related to *Asthi Dhatu*.

As a combined effect of these factors *Dhatu Kshaya* occurs. According to the principles of *Ashrayaashrayibhava* explained by *Acharya Vagbhat*, *Asthi Dhatu* among the *Sapta Dhatu* is most fictile to be affected since *Vata* and *Asthi* are inversely proportional. So, to sum up briefly, it can be said that *Asthikshaya* is caused due to the *Dhatu Kshaya Karaka* and *Maragavarana Karaka*, *Nidana Sevana* causing the *Prakupita Vata* to fill the *Riktatata* in *Astivaha Strotases* which are barren of *Snehadi Gunas* and cause *Asthikshaya*.

Poorva Roopa

As we all know that the *Poorva Roopa* in *Vata Vyadhi* is *Avyakta*. *Chakrapani* in his commentary has clarified that *Avyakta* can be taken as *Alpa Vyaktata* or as *Asampoorna Lakshanas* or as mild *Lakshanas*. Like *Asthishula*, *Toda*, *Bheda*, *Shrama*, *Sandhishaitilya*, *Danta Shadana*, *Nakha Shadana*, *Danta* and *Nakha Bhanga* manifested in mild form.

Rupa

Acharya Charak has mentioned it along with the *Lakshanas* of *Asthadasa* (18 types) *Kshaya*.

In *Harita Samhita* the *Lakshanas* of *Asthikshaya* are described along with the *Lakshanas* of *Kshaya (Rajayakshma)*. *Pravrudha Vata Dosha* is the main factor for the cause of *Asthi Kshaya* owing to the *Ashrayasrayi Bhava*. So, the *Lakshanas* are due to the *Vata Vruddhi*, hence various types of *Vedanas* are seen in the *Asthis* and *Sandhis*. Since the *Dhatu* metabolism involves two *Pakas* viz. *Prasada Paka* and *Kitta Paka*, the *Dhatu* when affected simultaneously affects the *Upadhathu* and *Malas*, as a common rule. When there is defect in *Dhatu* metabolism due to improper supply of nutrients, naturally the *Prasada Paka* and the *Kitta Paka* are affected leading to the *Vikaras* of *Dhatu*, *Upadhatu* and *Mala* also.

CONCLUSION

Asthikshaya is a disabling disease which renders Human a bedridden life. The prevalence of *Asthikshaya* in old age males and in postmenopausal female are more. Peak bone mass is attained by the age of 30 years. *Asthikshaya* is one of the *Swabhavabala Pravrutta Vyadhi* as in this *Vaya (Vridhdhavastha)* plays major role along with *Vata*

as *Pradhana Dosha* and *Asthi* as *Pradhana Dhatu*. Analysis of textual references regarding aetiology of *Asthikshaya* discloses fact that *Vatakara Nidana* plays a significant role in manifestation of *Asthikshaya*. It is concluded that any abnormalities in *Vyana Vata*, *Udana Vata*, *Samana Vata Pachaka Pitta*, *Shleshmaka Kapha*, *Kledaka Kapha* and *Aharaja*, *Viharaja Nidana* result in *Asthikshaya*. There is no textual reference regarding the *Purvarupa* of *Asthikshaya*, so *Lakshanas* of *Asthikshaya* when expressed in mild nature are considered as *Purvarupa* of *Asthikshaya*. *Lakshanas* of *Asthikshaya* are *Asthishula/Toda/Bheda*, *Sandhi Shaitilya*, *Shrama*, *Danta Kesha Nakha Prapatana*, *Danta Bhanga*, *Nakha Bhanga*. These *Lakshanas* have close resemblance with symptoms of Old age osteoporosis in modern science which include pain in the back, deformity of spine, risk of developing fractures. *Madhura Rasa Pradhana Dravya* like *Shali*, *Rakta Shali*, *Masha* etc, *Amla* and *Lavana Rasa Pradhana Dravya*, *Dugdha*, *Dadhi*, *Takra* and *Ghrta*, *Mamsa*, *Mamsa Rasa*, *Niyamita Vyayama*, *Abhyanga* and *Swedana*, *Vata Nashaka* and *Vedana Shamaka Aushadhi* are said to be the *Upashayas* of the *Asthikshaya*. *Majja Kshaya*, *Shukra Kshaya*, *Oja Kshaya* and *Fractures - Anga Bhanga* should be considered as complication of *Asthi Kshaya*.

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