

Critical Review of Asthikshaya and its Management: Ayurvedic Perspective

Shilpa M. Gabhane¹, Rajiv J. Mundane², Geeta V. Sathavane³, Vasant Gawande⁴

¹Professor, Rognidan-Vikritivigyan Department, Datta Meghe Ayurvedic Medical College, Hospital & Research Centre, Wanadongri, Nagpur; ²Principal & HOD, Rognidan- Vikritivigyan Department, D.M.M. AyurvedMahavidyalaya, Yavatmal, ³Associate Professor, Rognidan-Vikritivigyan Department, Datta Meghe Ayurvedic Medical College, Hospital & Research Centre, Wanadongri, Nagpur; ⁴Associate Professor Dept. of Orthopedics Jawaharlal Nehru Medical College, Datta Meghe Institute of Medical Sciences, Wardha

Abstract

The state of equilibrium of Dosha, Dhatus, Malas is health and its disequilibrium is known as disease. This disequilibrium may either be Vriddhi or Kshaya. Asthi is the fifth Dhatu among the seven Dhatus. It is the seat of vatadosha and carrying the function of dehadharana. Asthikshaya is one of the conditions described by Acharya Charak under 18 types of Kshaya in which there is Kshaya of Asthi Dhatu. According to the principle of Ashraya-ashrayee Bhava, Asthi & Vata are inversely proportional to each other regarding Vriddhi and Kshaya. Vriddhvata leads to Kshaya of Asthi Dhatu. The symptoms of Asthikshaya resemble Osteoporosis which is a major health problem of the ageing population. It is a 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. Fracture is the most common complication of Osteoporosis which increases the risk of morbidity as well as mortality. Vata is the major factor in the Samprapti of Asthikshaya, Samprapti of Asthikshaya occurs in two ways- Dhatukshaya and Srotorodhajanya. In Srotorodhajanya, the obstruction can be cleared by the use of Deepana and Pachana Dravyas. Nidanparivarjana, Shodhanachikitsa including Basti, Shamana Chikitsa including use of Swayoni Dravyas, Sudha Vargiya Dravyas, Guggululalapa are the major treatment modalities for Asthikshaya. They help in Vatashamana and as well as improving the bone health. By following Dincharya, Rutucharya and diet regulation, this disease can be prevented. This review article highlights the etiopathogenesis of Asthikshaya and its measures as per Ayurvedic perspective.

Keywords: *Asthikshaya, Osteoporosis, Nidanparivarjana.*

Introduction

Human body is made up of Panchamahabhutas. The state of equilibrium of Dosha, Dhatus, Malas is health and its disturbance is known as disease.¹ This disequilibrium may either be Vriddhi or Kshaya. According to Ayurveda, Balyavastha is a period of Dhatunirman or anabolic phase; Yuvavastha maintains Samavastha (equilibrium) of different Dhatus; but in old age all Dhatus decrease gradually as catabolism speeds up. Asthikshaya is a condition described by Acharya Charak under 18 types of Kshaya.² Asthi & Vata are inversely proportional to each other regarding Vriddhi and Kshaya. Vriddhvata leads to Kshaya of Asthi.³ The symptoms of Asthikshaya are similar to Osteoporosis,

in which there is a decrease in bone mass leading to increased bone fragility and susceptibility to fractures. By 2050, the global osteoporosis sufferers will reach 6 million (including both males and females), 3/4 of who will reside in developing countries.⁴ Fractures of vertebral bodies, ribs, proximal femur, humerus, distal radius with minimal trauma are the most common complications.⁵ Advanced age, female sex, sex hormone deficiency, a diet having low calcium, protein and vitamin-D, smoking, alcoholism, prolonged corticosteroid therapy, low Body Mass Index (BMI) are some of the risk factors of Osteoporosis.⁶ But it is seen that people consuming nutritious diet are also suffering from the disease. If the symptoms are present before menopause, they grow rapidly after menopause. Here an effort is made to study

the etiopathogenesis of Asthikshaya and its management according to Ayurveda.

Aims and Objectives:

1. Study the Asthikshaya and Osteoporosis in Ayurvedic and modern perspective.
2. Study the management of Asthikshaya in light of Ayurveda.

Materials and Method

The concept of Asthikshaya is studied from various Ayurvedic Samhitas while the concept Osteoporosis is studied from modern books, by searching various databases like PubMed, google scholar and other research articles.

Asthikshaya: Asthisaushirya is another condition explained in Majjadhatukshaya.²⁵ Saushirya is Sarandhratvam means porous bones.⁷ Asthikshaya is the first stage of the disease, which is mainly characterized by different kinds of pain and deformities of Upadhatu and Malas of Asthi. Dantha, Nakha, Kasha etc. As the disease progresses, as per the principles of Anulomakshaya, it will affect Majjadhatu and manifest as Asthisoushirya, so Asthisaushirya is increase in porosity of bones which may lead to Bhagnaafterwards.

Asthi Dhatu Guna and Karma: Asthi is a Pitruja Avayava (paternal tissue). Guru (heavy), Khara (rough)²⁶ Kathina (hard), Sthula (bulkiness), Sthira (stable) and Murtimandare the Gunas of Asthi Dhatu. Its function is Dehadharana (supports the body and gives perfect shape to the body), Majjapushti (acts as reservoir of Majjadhatu) and it is the seat of vata.⁸

The etiological factors for Asthikshaya: The etiological Factors of Asthikshaya are not explained separately in the text. On the basis of Ayurvedic principle of Ashrayashrayee Bhava, The increase or decrease of Asthi and Vata are inversely proportional to each other. Hence the factors vitiating Vata will cause decrease in Asthi Dhatu. Acharya Charak had explained Samanya Nidana (general etiological factors) leading to the Kshaya of 18 types which includes mostly the Vataprakopak Nidana.⁹ The factors provoking Vata are excessive exercise, intake of dry vegetables, irregular dietary habits which includes excessive fasting, dieting and limited foods, excess of food also, excess of worry, grief, fear, hunger, waking at nights, letting out excess of blood, Dosha, Dhatu Mala and time factor (Adanakala and Vridhavastha).

Majjadhatu is the next to Asthi Dhatu which is present inside the Asthi Dhatu and very closely related to each other. Hence the factors responsible for the vitiation of Asthivaha and Majjavaha Srotas are also responsible for Asthikshaya. The vitiating factor of Majjavaha Srotas such as intake of Abhishyandi and incompetent diet vitiates Vata due to Margavarodha (obstruction).¹⁰ Vitiation of Asthivaha Srotas directly leads to aggravation of Vata, resulting in Asthikshaya.¹¹ Acharya Dalhana described the Asthidhara Kala as Purishdhara Kala.¹² So the causative factors responsible for vitiation of Purishvaha Srotas are also responsible for Asthikshaya. It includes suppression of urge for stool, consumption of large quantity of food, eating during indigestion, eating before digestion of previous meal, person having weak Agni and emaciation.¹³

Symptoms of Asthikshaya according to different Samhitas¹⁴⁻¹⁹:

Symptoms	Charaka	Sushruta	Ashtang Sangraha	Ashtang Hrudaya	Bhavaprakash	Harita Samhita
Kesha vikara	+	-	+	+	-	-
Loma vikara	+	-	+	+	-	-
Nakhavikara	+	+	+	+	+	-
Smashruvikara	+	-	-	+	-	-
Dantavikara	+	+	+	+	+	-
Shrama	+	-	-	-	-	-
Asthi Toda	-	-	+	+	-	-
Ruja	-	-	-	-	-	+
Asthi Shula	-	+	-	-	+	-

Symptoms	Charaka	Sushruta	Ashtang Sangraha	Ashtang Hrudaya	Bhavaprakash	Harita Samhita
Ruja	-	-	-	-	-	+
Sandhishaitilya	+	-	+	-	-	-
Rukshata	-	+	+	-	+	-
Parushya	-	-	+	-	-	-
AsthiBaddha Mamsabhilasha	-	-	+	-	-	-
Angabhanga	-	-	-	-	-	+
Atimandacheshta	-	-	-	-	-	+
Medakshaya	+	-	-	-	-	+
Viryasyamandya	-	-	-	-	-	+
Vikampana	-	-	-	-	-	+
Vamana	-	-	-	-	-	+
Visangnata	-	-	-	-	-	+
Shosha	-	-	-	-	-	+
Kathorata	-	-	-	-	-	+
Shopha	-	-	-	-	-	+

Samprapti: Samprapti of Asthikshaya is not explained in Ayurvedic texts. Vitiating of Vata is the main factor in Samprapti of Asthikshaya. Vitiating of Vata occurs by two ways; Dhatushaya and Margardha.²⁰ Therefore the Samprapti can be explained by two ways, one is Dhatushaya and another is Margardha. *Apatarpan* i.e. taking Vataprakopak Ahara (diet) and *Vihara* (living habits) leads to vitiating of Vata due to decrease in Dhatus and the Srotas become Rikta (devoid of unctuousness). Vitiating Vata fills the Rikta Srotas. The walls of Srotas get stretched by the force of Vata leading to weaken them and vitiating Vata overpowers the weak Srotas to create disease.

Osteoporosis: The remodelling of bone is a continuous process throughout the life, for many years after closure of the epiphyses, skeletal mass remains constant and the rates of bone formation and resorption are approximately equal. In Osteoporosis the rate of bone resorption accelerates that of bone formation.²¹

Women are more prone to Osteoporosis than men. The bone loss starts from the age of 30–40 years in both men and women. In women, menopause is followed by an immediate decrease in bone mass and density within a year. This increased rate of bone loss reaches

steadiness approximately 10 years after menopause and then merges into a continuous age-related loss.²² Thus due to age-related bone loss in addition to menopausal bone loss women suffer more from Osteoporosis.

Changes in calcium metabolism occur with the age. As age advances, there is decrease in absorption of calcium from gut and increase in calcium loss by kidney and skin. It has been reported that with aging and after menopause, fractional calcium absorption decreases on average by 0.21 percent per year after 40 years of age.²³ Osteoporotic fracture can turn out to be life threatening; 1 in 5 persons die during the first year after a hip fracture, whereas nearly one third need nursing home placement after hospital discharge, and fewer than one third recover their prefracture level of physical function.^{24,25}

Classification of Osteoporosis.^{26:} Primary Osteoporosis & Secondary Osteoporosis Symptoms^{27:} Fracture after minimal trauma, Joint pain, Low back pain, Neck pain, Stiffness of joints, Bony tenderness, Deformity of joint, Deformity of spine (Kyphosis).

Diagnosis as per Modern Medicine

Bone Densitometry: It is indicated in 1) premenopausal women with long term steroid therapy, Primary or secondary amenorrhoea, post oophorectomy,

organ transplantation 2) post-menopausal women who are not on estrogen therapy, vertebral or hip fractures and 3) men with unexplained fractures, hypogonadism and history of recurrent falls.²⁸

Bone Mineral Density (W.H.O. criteria for Osteoporosis)²⁹: Bone density measurements of healthy young adults in a population are taken as the reference measurement (called a T-score). Osteoporosis is diagnosed when a person's BMD is equal to or more than 2.5 standard deviation below this reference measurement. Osteopenia is diagnosed when the measurement is between 1 and 2.5 standard deviation below the young adult reference measurement.

As per this criteria, T- score value determines the bone health. It is graded as follows:

T-score

- Normal = -1 & Above
- Osteopenia = Between-1 to-2.5
- Osteoporosis = less than or equal to-2.5
- Severe osteoporosis = less than-2.5 with fracture

Prevention and Management: Old age, sedentary life style and unwholesome diet and behavior and stress are the causative factors of this disease. Old age is inevitable, so by avoiding later factors and following Ayurvedic principles and medications the disease can be managed.

Nidanparivarjana³⁰: It is the first and foremost method of managing the disease. The factors responsible for aggravation of Vata i.e. VataprakopakaAhara, Vihara, stress should be avoided. Aggravating factors for Osteoporosis should be avoided e.g. Smoking, alcohol, inactivity, poordiet. Stoppingthe indulgence of factors will increase the chances of getting disease or progression of disease.

Shamana: Vitiation of Vata takes place due to both Santharpana and Apatharpana. Apatharpana directly causes Vatavidhi, while Santharpana leads to Margavarodha which in turn causes Vatavidhi. Most of the metabolic diseases occur due to disturbance of Agni. When Agni is diminished, it leads to Ajeerna and further formation of Ama takes place. Ama further deteriorates the Agni leading to blockage of channels. Therefore, management of disease should start from the level of Jatharagni and Dhatwagni. It should be

corrected by administration of Deepana and Pachana Dravyas in the form of Churna or Ghrita processed with these dravyas²⁷ such as TrikatuChurna, Panchkola Churna,PippalyadiGhrita, ArdrakaGhrita.

Sudha Varga: For the treatment of diminished Dhatus, use of drugs which are similar to diminished Dhatus are indicated. These drugs bring about increase in that Dhatu²⁸ these include Pravalbhasma, Pravalpishti, Mukta shuktibhasma, Shankhabhasma, Kapardikabhasma, Kukkutandatwakhbhasma.

Guggulukalpa: Lakshadi Guggulu, Abhadi Guggulu, Trayodashang Guggulu, Yograj Guggulu.

Shodhana-Basti Chikitsais the major treatment modality for Vatadosha. Pakvashaya is the place of Purishdhara Kala which resembles Asthidhara Kala where BastiDravya reaches & it is also the main seat of Vata Dosha. Hence it acts on AsthiDhatu. Thus, Basti plays an important role in strengthening the AsthiDhatu and act as preventive measures for Asthikshaya.

Vaghbhatta had mentioned Tiktaksheera Basti in the treatment of Asthikshaya. For Asthipradoshaja Vikara, Charakacharya has given the similar line of treatment which includes Panchakarma, especially Basti which contains Kshira, Ghrita and Tikta Dravya.

Discussion

In today's perspective, due to sedentary life style, faulty food habits and excessive stress metabolic diseases are occurring commonly. Asthikshaya is one among these diseases. The symptoms of Asthikshaya are similar osteoporosis in which there is decline in the bone tissue. A condition known as Osteopenia is considered as pre stage of osteoporosis. In this condition also, there is decrease in bone mineral density but it is not as notable as compared to Osteoporosis. Asthikshaya is the earlier stage characterized by different kinds of pain and deformities of Upadhatus and Malas of Asthi. As the disease progresses, as per the principles of Anulomakshaya, it will affect Majjadhatu and manifest as Asthisousharya characterized by porosity of bone. So it is better to compare Osteopenia with Asthikshaya and Osteoporosis with Asthisousharya.

Vitiation of VataandAsthi, Majja Dhatu are the main factors in Samprapti of Asthikshaya. The Samprapti may follow two patterns, one is Margarodha and another is Dhatuksaya. In old age as there is predominance

of Vata Dosha and decrease in Dhatus, the disease occurs due to Dhatukshayajanya Samprapti. When the disease occurs in obese people, in middle aged people who are taking calcium rich diet, nutritious diet, it follows Margavarodhajanya Samprapti. Menstruation is considered to be SrotasShodhana. Early menopause leads to Srotorodha, disturbs the AnulomaGati of Vata and vitiates Vata.

In Srotorodha, the obstruction can be cleared by the use of Deepana and Pachana Dravyas. It helps in improving the Jatharagni and Dhatwagni. Any symptom related to upper or lower gastrointestinal tract persisting for longer duration should not be taken frivolously. It should be corrected by use of Deepana and Pachana Dravyas. These medicines also correct the Dhatwagnimandya.

Acharya Sushruta mentioned SwayoniDravyas in the treatment of Asthikshaya. Sudha Vargiya Dravyas are Samana Dravya of the Asthi Dhatu. These drugs bring about increase in Asthi Dhatu.

Major content of Lakshadi Guggulu, Abhadi Guggulu and Trayodashang Guggulu is Guggulu. Guggulu Ushnaviryatmaka, Tridosahar, Rasayana, Asthisandhanakar, Deepana, and Vatanashaka in properties. By its Vatahamaka Guna and Ushnavirya, it relieves pain in Asthikshaya. When its Kalpas with dravyas such as Laksha, Baboolare used, they help in binding of broken bones and filling the empty bones with calcium and helps in deposition of calcium.

The Kshaya: Vriddhi of earlier Dhatus like Rasa, Rakta, Mamsa, Meda are measured clinically and laboratory findings, but deeper Dhatus like Asthi, Majja, Shukra are difficult to measure clinically. A person used to see the doctor for checking his blood sugar, blood pressure, lipid profile etc., but he rarely sees a doctor to know his bone health. In Osteoporosis, most of times there is a long latent phase before clinical symptoms develop. So it is important to go to the doctor if any risk factors are relevant to the person.

Ayurveda strains more on the prevention of diseases. By following proper Dincharya and Rutucharya, the disease can be prevented.

Abhyanga followed by Atapasevan should be incorporated in daily routine for improving bone health. Dantadhavana and Tailagandusha will help to maintain dental cleanliness and health. Shiroabhyanga will

prevent excessive hair fall and graying of hairs. Nasya is useful to maintain the health of all Urdhwajatrugata Vikaras.

Food articles having Madhura, Amla, Lavana rasa, Guru, Snigdha, Ushnagunas which are Vatadoshashamaka and Asthimajjaposhaka should be included more in Ahara. Intake of milk, cheese and other dairy foods, green leafy vegetables, legumes and dried fruits help to improve calcium level.

Conclusion

Osteopenia and Osteoporosis can be better correlated with Asthikshaya and Asthisoushrya respectively. Along with the factors responsible for vitiation of Vata, factors vitiating Asthivaha, Majjavahas and Purishavaha Srotas are considered as the causative factors for Asthikshaya. Samprapti of Asthikshaya occurs in two ways i.e. Dhatukshayajanya and Margavarodhajanya. In old age, many therapies are not convenient for patients, so it is better to prevent Osteoporotic changes right from early age by following Dincharya and Rutucharya. In case the disease is present, by making optimistic lifestyle changes and following appropriate treatment including Basti, making use of Swayoni Dravyas and herbomineral preparations, it can be managed at early stage.

Ethical Clearance: Taken from institutional ethics committee.

Source of Funding: Self.

Conflict of Interest: Nil.

References

1. Facts and Statistics- International Osteoporosis Foundation <https://www.iobonehealth.org> Ebnezar J. Essentials of Orthopedics for Physiotherapists, Edition 2003, 357-359p.
2. Harrison's textbook of Internal Medicine 15th edition, Vol.2, Chapter 425, 2488p
3. Gupta K, Vagbhata, Asthanga sangraha Chaukamba Sanskrit Academy, Varanasi, ed 2016; Sutrasthana 11/4, 86p
4. Paradkar B, Vagbhata, Asthanga Hridaya, Sarvangsundara Tika, Krishnandas Academy, Varanasi, 2000; Sutrasthana 11/19
5. Pandey K, Chaturvedi G, Vidyotini T, Achaarya C and Dhruhabala, Chaukhambha Bharati Academy, Varanasi, Edition 1998, Vol.2, Chikitsasthana

- 15/31, 458p.
6. Gupta K, Vagbhata, Asthanga Hrudaya, Vidyotini Tika, Chaukamba Sanskrit Sansthan, Varanasi, ed 2000; Sutrasthana 11/4, 86p.
 7. Pandey K, Chaturvedi G. Vidyotini T, Achaarya Cand Dhruhabala, Chaukhambha Bharati Academy, Varanasi, Edition 2003, Vol 1, Sutrasthana 17/76, 77, 352p
 8. Pandey K, Chaturvedi G. Vidyotini T, Achaarya Cand Dhruhabala, Chaukhambha Bharati Academy, Varanasi, Edition 2003, Vol.1 Vimanasthana 5/18, 713p.
 9. Pandey K, Chaturvedi G. Vidyotini T, Achaarya Cand Dhruhabala, Chaukhambha Bharati Academy, Varanasi, Edition 2003, Vol 1 1 Vimanasthana 5/17, 713p.
 10. Achaarya Y. Sushrut Samhita, Aacharya Sushrut, Nibandhasangraha by Sri Dalhanacharya, Chaukhamba Orientalia, Varanasi, 4th ed. 1980; Kalpasthana 4/40.
 11. Pandey K, Chaturvedi G. Vidyotini T, Achaarya Cand Dhruhabala, Chaukhambha Bharati Academy, Varanasi, Edition 2003, Vol 1 Vimanasthana 5/21, 714p.
 12. Pandey K, Chaturvedi G. Vidyotini T, Achaarya Cand Dhruhabala, Chaukhambha Bharati Academy, Varanasi, Edition 2003, 1 Vol 1 Sutrasthana 17/67, 348p.
 13. Shastri K. Sushrut Samhita, Aacharya Sushrut, Ayurved Tattva Sandipika tika, Chaukhamba Sanskrit SansthanVaranasi, ed. 2007; Vol 1 Sutrasthana 15/13, 58p.
 14. Gupta K., Vagbhata, Asthanga Sangraha, Chaukhambha Krishnadasacademy, Varanasi, ed 2016; Vol.1, Sutrasthana 19/10, 154p
 15. Gupta K., Vagbhata, Asthanga Hridaya Vidyotini Tika Chaukamba Sanskrit Sansthan, Varanasi, ed 2000; Sutrasthana 11/19, 87p.
 16. Mishra B, Bhavaprakash, Vidyotini tika, Chaukhamba Sanskrit Bhavan, Varanasi, 12th edition 2016, Poorvakhandha 7/83, 1078p.
 17. Tripathi H, Harita Samhita Chaukhambha Krishnadasacademy, Varanasi, ed 2005; Tritiyasthana 9/22 264p.
 18. Pandey K, Chaturvedi G. Vidyotini T, Achaarya C, Charaka and Dhruhabala, Chaukhambha Bharati Academy, Varanasi, Edition 1998, Vol.2, Chikitsasthana 28/59, 788p.
 19. Shah S, M. Paul A, API T.B. of Medicine, The Association of Physicians of India, Mumbai Vol.1 ed. 8th 2009 p.226
 20. Hunter D, Sambrook P.N. Bone loss. Epidemiology of bone loss. Arthritis Res Ther. 2000; 2:441-5.
 21. Heaney R, Recker R, Stegman M, Moy A. Calcium absorption in women: relationships to calcium intake, estrogen status, and age. Journal of Bone and Mineral Research. 1989;4(4):469-75.
 22. National Institutes of Health NIH consensus statement: osteoporosis prevention, diagnosis, and therapy. NIH Consents Statement. 2000; 17: 1-45)
 23. NIH Consensus Development Panel on Osteoporosis Prevention, Diagnosis, and Therapy. Osteoporosis prevention, diagnosis, and therapy. JAMA. 2001; 285: 785-795)
 24. Shah S, M. Paul A, API T.B. of Medicine, The Association of Physicians of India, Mumbai Vol.1 ed. 8th 2009 p.226
 25. Shah S, M. Paul A, API T.B. of Medicine, The Association of Physicians of India, Mumbai Vol.1 ed. 8th 2009 p.227
 26. Shah S, M. Paul A, API T.B. of Medicine, The Association of Physicians of India, Mumbai Vol.1 ed. 8th 2009 p.222
 27. Shastri K. Sushrut Samhita, Aacharya Sushrut, Ayurved Tattva Sandipika tika, Chaukhamba Sanskrit SansthanVaranasi, ed. 2006;Vol.2, Uttartantra 1/25, 11p.
 28. Pandey K, Chaturvedi G. Vidyotini T, Achaarya CCharaka and Dhruhabala, Chaukhambha Bharati Academy, Varanasi, ed. 1998, Vol.2 Chikitsasthana 15/75, 464p.
 29. Shastri K. Sushrut Samhita, Aacharya Sushrut, Ayurved Tattva Sandipika tika, Chaukhamba Sanskrit SansthanVaranasi, ed. 2007;Vol.1, Sutrasthana 15/12, 58p.
 30. Das G, Shastri K, Bhaishjya Ratnavali, Vidyotini tika, Chaukhamba Prakashana, 18th ed.2019 49/13-14, 859p.