



A Comprehensive Study Of *Kesha, Loma, Nakha & Danta* With Special Reference To *Asthi Dhatu*

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ABSTRACT

Ayurveda, the ancient Indian system of medicine, describes the human body as being composed of seven fundamental tissues or *Dhatus*, among which *Asthi Dhatu* (bone tissue) plays a crucial role in providing structural support and stability. According to *Ayurvedic* principles, *Kesha* (hair), *Loma* (body hair), *Nakha* (nails), and *Danta* (teeth) are considered as *Upadhatu*s or *Mala* (by-products) of *Asthi Dhatu*, and their health and appearance directly reflect the state of the underlying bone tissue. This study aims to explore the intricate relationship between *Asthi Dhatu* and its *Upadhatu*s through the lens of both *Ayurvedic* and modern scientific

perspectives. The *Ayurvedic* concepts of *Dhatu Poshana Nyaya* (tissue nutrition), *Asthidhatvagni* (metabolic factors responsible for bone formation), and the role of *Vata Dosha* in maintaining bone health are discussed. The study highlights how imbalances in *Asthi Dhatu*, such as *Asthi Kshaya* (depletion) or *Asthi Vriddhi* (excess), manifest as visible changes in hair, nails, and teeth, such as brittleness, hair loss, dental caries, and nail abnormalities. These findings are correlated with modern scientific understanding of calcium metabolism, vitamin D deficiency, and hormonal influences on bone health. The genetic basis of conditions affecting both bones and ectodermal structures, such as ectodermal dysplasia and cleidocranial dysplasia, further substantiates the *Ayurvedic* concept of the interconnectedness of *Asthi Dhatu* and its *Upadhatus*. The study concludes that the health of *Kesha*, *Loma*, *Nakha*, and *Danta* can serve as valuable diagnostic indicators of *Asthi Dhatu*'s condition, enabling early detection and timely intervention in various bone disorders. The insights from this study underscore the relevance of *Ayurvedic* principles in understanding human physiology and the potential for integrating *Ayurvedic* and modern approaches in the diagnosis and management of bone health.

KEYWORDS:

Asthi Dhatu, Asthi Kshaya, Asthi Vriddhi, Danta, Dhatu-paka, Dhatvagni, Kesha, Loma, Mala Bhaga, Nakha, Prasada Bhaga, Upadhatu

INTRODUCTION

- *Ayurveda*, the ancient Indian science of life, describes the human body as an integrated system of *Dosha*, *Dhatu* and *Mala*. The body is said to be sustained, nourished and supported by seven *Dhatus*—*Rasa*, *Rakta*, *Mamsa*, *Meda*, *Asthi*, *Majja* and *Shukra*. Among these, *Asthi Dhatu* plays a central structural role. It not only provides the framework for the body but also supports the formation and maintenance of related structures such as *Kesha* (hair), *Loma* (body hair), *Nakha* (nails) and *Danta* (teeth).
- “दोषधातुमलमूलं हि शरीरम्” (सु.सू. 15/3)
- That is, not only *Doshas* and *Dhatus*, but also *Malas* are considered as *Mool* of *Sharir*. In other words these are essential for living being. All of these are important for the body to function in a healthy manner. This signifies that the equilibrium of *Dhatu* is essential for maintaining the integrity of the human body. If *Asthi Dhatu* is compromised, its related *Upadhatus* and *Malas* are also affected.

AIM

- A comprehensive study of *Kesha*, *Loma*, *Nakha* and *Danta Sharir* with special reference to *Asthi Dhatu*.

OBJECTIVES

- To compile and critically analysis the literature related to *Kesha*, *Loma*, *Nakha* and *Danta Sharir* from different *Samhitas* and other *Ayurvedic* texts in reference to *Asthi Dhatu*
- To evaluate their anatomical, physiological, embryological and applied aspect. So, *Ayurveda*, at this stage is found to being result oriented with absolute no drawbacks.

DHATU-PAKA & NUTRITIONAL TRANSFORMATION

The conversion of one *Dhatu* into the next is described through *Dhatupaka*:

- "सर्वेषां धातूनां धात्वग्निना एव पाकः।" (च.चि. 15/14)
- Body is made of Seven *Dhatus*. Food taken by person is converted by *Jatharagni* (Digestive secretions of G.I.T) into *Ahara Rasa*. Further this *Ahara Rasa* is converted in form of *Rasadi Dhatus* by metabolic activities at various tissue levels which is mentioned above tissue formation (*Dhatu Nirman Prakriya*). During the process of metabolism, *Dhatus* undergo a specific pathway through their own characteristic digestive enzymes termed as *Dhatvagni*. The formation of *Asthi Dhatu* follows this sequential pattern:

Rasa → *Rakta* → *Mamsa* → *Meda* → *Asthi* → *Majja* → *Shukra*

- पृथिव्यग्निनादीनां सङ्घातः स्वोष्मणा [५] कृतः॥
खरत्वं प्रकरोत्यस्य जायतेऽस्थि ततो नृणाम् ।
करोति तत्र सौषिर्यमस्थ्नां मध्ये समीरणः ॥
मेदसस्तानि पूर्यन्ते स्नेहो मज्जा ततः स्मृतः। (च.चि. 15/ 30, 31)

During this transformation, each *Dhatu* produces:

1. *Prasada Bhaga* (nutritive part)
2. *Mala Bhaga* (waste part)

➤ According to Charka:

“*Keshan Loman Nakhani Asthmalani.*” (च.चि. 15/17)

This establishes that hair, body hair and nails are the *Mala* of *Asthi Dhatu*, while *Sushruta* describes *Danta* as an *Upadhatu* of *Asthi*.

ASTHI DHATU: AYURVEDIC PERSPECTIVE

Nourishment to all *Dhatus* is provided in two ways

- First way- *Asthi Poshaka Amsa* are directly absorbed from *Ahara Rasa* in *Amashaya* with the help of *Jatharagni*. Here *Asthi Posaka Amsa* are substances which have similar *Panchabhautika* composition as that of *Ashti Dhatu*. As stated in modern physiology, 70% of human skeleton is made of calcium. Calcium is a major nutrient for bone formation. Calcium from food is absorbed in stomach in presence of hydrochloric acid. Hence calcium and other ions like phosphorus, magnesium, copper etc that form the solid mineral phase of bones; can be considered as *Asthi Posaka Amsa*.
- Second way-In case of *Asthi*, preceding *Dhatu* is *Meda*. When *Meda Dhatvagni* acts on *Meda*, subtle *Asthi Posaka Amsa* is derived from the *Sara* part. *Asthi Dhatu* is formed from *Meda Dhatu* through the action of *Asthi Dhatvagni*. Its *Panchabhautika* composition includes *Prithvi*, *Vayu*, *Agni*, *Akasha* and *Jala*, with *Prithvi* being predominant. In modern context, Vitamin D which is derived from sterols (a part of *Meda*), is essential for absorption of calcium. This 1, 25 dihydroxycalciferol forms calcium binding protein in intestines so that calcium is absorbed and transported into cell cytoplasm.
- “अस्थीनां धारणं तेषां मज्जानां पूरणं तथा।” (सु.सू. 15/5)

Functions of *Asthi Dhatu*:

- *Dehadharana* (structural support)
- *Majja Poshana* (nourishes bone marrow)
- Protection (rib cage, skull, vertebrae)
- Movement (musculoskeletal linkage)
- *Vata Ashraya* (seat of *Vata*)

- *Dalhana* describes *Asthi* as the “*Sthira* and *Kathina Dhatu*”, the hardest structural component of the body.

ASTHI DHATU DUSHTI & DISEASE CORRELATION

Asthi Kshaya Symptoms:

- अस्थिक्षयेऽस्थिशूलं दन्तनखभङ्गो रौक्ष्यं च । (सु.सू. 15/9)

- Bone pain
- Cracking sound
- Hair fall
- Nail brittleness
- Tooth sensitivity
- Fatigue

Asthi Vriddhi Symptoms:

- अस्थ्यध्यस्थीन्यधिदन्तांश्च । (सु.सू. 15/14)

- Extra bone formation
- Thick nails
- Large teeth

Related diseases (*Sushruta & Charaka*):

- *Adhyasthi*
- *Asthi-bheda*
- *Dantastha shoola*
- *Keshapidaka*
- *Nakha roga*
- Osteoporosis
- Rickets
- Osteoarthritis

KESHA (Hair) AND ASTHI DHATU

Ayurveda correlates hair health with *Asthi Dhatu*. When *Asthi Dhatu* is strong, hair becomes:

- Dense
- Lustrous
- Strong
- Deeply rooted

Conversely, *Asthi Kshaya* leads to:

- Hair fall
- Loss of density
- Premature greying
- Alopecia

➤ “केशलोमनखश्मश्रुद्वजप्रपतनं श्रमः।ज्ञेयमस्थिक्षये लिङ्गं...” (च.सू. 17/67)

Modern Correlation:

Hair arises from ectodermal tissue and depends on:

- Calcium metabolism
- Collagen matrix
- Hormonal balance
- Microcirculation of scalp
- Nutritional absorption

Thus, *Asthi Dhātu* depletion affects hair via nutritional deficiency, hormonal imbalance and impaired mineral deposition.

LOMA (Body Hair) AND ASTHI DHATU

Loma is also considered a *Mala* of *Asthi Dhātu*. In *Ayurveda*, *Loma* indicates:

- Thermoregulation
- Sensory perception
- *Vata* activity on skin

When *Asthi Dhātu* deteriorates:

- Body hair becomes sparse
- *Vata* aggravation causes dryness of skin and hair follicles

Modern correlation:

Body hair development depends on the interaction of keratinocytes, melanocytes and hormonal signals.

NAKHA (Nails) AND ASTHI DHATU

Nails, being the *Mala* of *Asthi Dhatu*, reflect the condition of the bones directly.

Asthi Vriddhi causes:

- Thick, strong nails
- Fast nail growth

Asthi Kshaya causes:

- Brittle nails
- Splitting / peeling
- Slow nail growth
- Pale or spoon-shaped nails (koilonychia)

Modern correlation:

Nails are made of keratinized epithelial cells dependent on:

- Calcium
- Zinc
- Iron
- Protein
- Vitamin D

Osteopenia and osteoporosis show parallel changes in nail density and brittleness.

DANTA (Teeth) AND ASTHI DHATU

Sushruta classifies teeth as *Ruchaka Asthi*, a direct derivative of *Asthi Dhatu*.

Danta formation is described embryologically in two major phases:

1. Odontogenesis
2. Calcification

Danta as *Upadhatu* depend on:

- Calcium-phosphate matrix
- Vitamin D metabolism
- Osteoblast / odontoblast activity

Asthi Dhatu Kshaya → leads to:

- Dental caries
- Weak enamel
- Sensitivity
- Early tooth loss

"दन्ता रूष्यन्ति अस्थिसारात्।" (सु.शा. 5/20)

MODERN SCIENCE PARALLELS

Modern physiology supports the *Ayurvedic* claim that hair, nails and teeth reflect the internal state of bone tissue.

1. Hair & Bones

Calcium deficiency affects keratin production → thinning hair

Cortisol excess affects bone density → hair loss

Vitamin D deficiency → alopecia + osteoporosis

2. NAILS & BONES

Nail density parallels bone mineral density

fragile nails may indicate hypocalcemia

3. TEETH & BONES

Tooth enamel formed from hydroxyapatite like bone

Osteopenia increases dental complications

Chronic *Vata* aggravation parallels osteoarthritis

4. ALL HAVE COMMON DEVELOPMENTAL PROCESSES

All these structures — bones, teeth, nails, and hair — undergo processes of cell differentiation, mineralization, and keratinization, regulated by common biochemical and genetic pathways.

5. GENETIC AND HORMONAL REGULATION

Modern studies reveal that genes such as Runx2, BMP, FGF, and Wnt pathways regulate osteogenesis (bone formation), while similar signaling pathways are involved in the morphogenesis of hair follicles and teeth.

Hormones like thyroid, parathyroid, growth hormone, and sex hormones also influence both bone and hair/nail health.

Thus, modern science validates ancient *Ayurvedic* classifications.

6. EMBRYONIC LAYERS AND GERMINAL ORIGINS

Although *Kesha*, *Loma*, and *Nakha* are derived mainly from the ectoderm, and *Asthi* (bone) arises from the mesoderm, their developmental pathways are interlinked.

MODERN PROOF OF AYURVEDIC CONCEPT

Modern clinical genetics provides clear examples of how a single genetic mutation can simultaneously affect hair, nails, teeth, and sometimes bones — exactly the correlation *Ayurveda* makes through the *Asthi Dhātu*–*Upadhatu* connection. For instance:

- Ectodermal dysplasia – mutations in *EDA*, *EDAR*, or *TP63* genes cause abnormalities of hair (sparse), nails (brittle or absent), and teeth (missing or malformed).
- Cleidocranial dysplasia – caused by *RUNX2* gene mutation, results in defective bone and tooth development together.
- Pachyonychia congenita – due to *KRT6* or *KRT16* gene mutations, causes thickened nails and hair abnormalities.
- Hypophosphatasia – involves *ALPL* gene affecting bone and teeth mineralization.

These conditions demonstrate that bone, teeth, nails, and hair are genetically and metabolically interdependent — just as *Ayurveda* proposes that they are different manifestations of a single *Dhātu* system (*Asthi Dhātu*).

DISCUSSION

- This study reaffirms that *Kesha*, *Loma*, *Nakha*, and *Danta* are *Upadhatu*s of *Asthi Dhātu*, both conceptually and functionally. Their development, nourishment, and pathology correspond directly to the state of *Asthi Dhātu*.
- The *Ayurvedic* understanding of these relationships stands validated through modern embryology, histology, and clinical science. The observation of these structures can serve as early diagnostic markers of *Asthi Dhātu* health and can guide preventive and therapeutic measures.
- Through the critical review and correlation of *Ayurvedic* and modern sciences, it becomes evident that *Ayurveda* provides a complete, coherent, and logically consistent understanding of structural biology and physiology. The concepts of *Upadhatu*, *Dhātu Poshana Nyaya*, *Srotas*, and *Agni* explain the same physiological mechanisms that modern science identifies as tissue metabolism, nutrient absorption, and cellular differentiation.
- When analyzed critically, *Ayurveda* emerges not as a philosophical system alone but as a practically applicable, result-oriented medical science capable of integrating with contemporary biological

understanding. There are no contradictions, only different terminologies describing the same physiological truths.

CONCLUSION:

- *Asthivaha Srotas* (channels responsible for bone nourishment) and *Asthidhatvagni* are governed mainly by *Vata Dosha* and supported by *Kapha Dosha* (especially its subtypes *Shleshaka Kapha*)
- Any disturbance in *Vata* or *Agni* leads to impaired *Asthi Dhatu*
- In *Ayurveda*, the human body is described as being composed of seven *Dhatus* — *Rasa*, *Rakta*, *Mamsa*, *Meda*, *Asthi*, *Majja*, and *Shukra* — which form the fundamental supporting tissues of life. Among them, *Asthi Dhatu* is the fifth *Dhatu*, responsible for providing structural strength and stability to the body. The classical texts mention that *Kesha* (head hair), *Loma* (body hair), *Nakha* (nails), and *Danta* (teeth) are the *Upadhatus* or *Mala* (by-products) of *Asthi Dhatu*. Their nourishment and normal appearance, therefore, depend directly upon the health and integrity of *Asthi Dhatu*.
- The portion of *Asthi Dhatu* that is not used for the nourishment of bone tissue contributes to the formation of *Kesha*, *Loma*, *Nakha*, and *Danta*. Hence, any disturbance in the process of *Asthi Dhatu Poshana*, or imbalance in *Asthidhatvagni* and *Vata Dosha*, results in visible changes in these external structures.
- From the *Ayurvedic* pathological perspective, depletion or vitiation of *Asthi Dhatu* (*Asthi Kshaya*) manifests as roughness, brittleness, hair fall, loosening of teeth, or fragile nails. These symptoms correspond closely with clinical features seen in modern conditions such as osteoporosis, rickets, and calcium or vitamin D deficiency. Thus, observing the condition of *Kesha*, *Loma*, *Nakha*, and *Danta* can serve as a valuable non-invasive diagnostic indicator of the internal state of *Asthi Dhatu*. This concept highlights the extraordinary diagnostic insight of ancient *Acharyas*, who could infer internal health through external examination.
- The interrelationship between *Asthi Dhatu* and *Kesha*, *Loma*, *Nakha*, *Danta* demonstrates *Ayurveda*'s deep anatomical and physiological insight. Hair, nails and teeth act as external indicators of internal bone health. Modern science supports this correlation through calcium metabolism, keratin biology and osteogenesis. Clinical observation of hair, nails, and teeth can serve as diagnostic indicators of *Asthi Dhatu Dushti* or *Kshaya*.

Thus, strengthening *Asthi Dhatu* holistically enhances:

- Hair quality
- Nail integrity
- Dental strength
- Skeletal health

This combined *Ayurvedic* and modern approach reaffirms the holistic framework of human physiology.

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