



Review Article

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THE INTERRELATIONSHIP OF *VATA DOSHA*, *ASTHI DHATU*, AND *ASTHIVAHA SROTAS* IN THE PATHOGENESIS OF *ASTHIPRADOSHHAJA VIKARA*

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ABSTRACT

Background: *Ayurveda* describes skeletal health through the interdependent concepts of *Vata Dosha*, *Asthi Dhātu* and *Asthivaha Srotas*. Their relationship is clinically important because *Vata* is located in *Asthi*, while excessive *Vata* and inadequate tissue nutrition are repeatedly associated with depletion, pain and structural deterioration. **Objective:** To critically analyse the *Vata-Asthi* relationship, the functional significance of *Asthivaha Srotas* and their combined role in the pathogenesis of *Asthipradoshaja Vikara*. **Methods:** A critical narrative review was undertaken using the *Brihatrayi*, principal commentarial interpretations and selected contemporary literature on bone remodelling and musculoskeletal ageing. Classical concepts were compared thematically under *Dosha*, *Dhatu*, *Agni*, *Srotas* and *Samprapti*. **Results:** The reviewed framework suggests that *Asthi* pathology cannot be reduced to a local defect of bone. *Vata*-provoking exposures, *Agni* and *Asthi-dhatvagni* disturbance, defective *Dhatu*-poshana and *Asthivaha-srotodushti* interact to produce either depletion-dominant or abnormal-growth manifestations. *Asthi Kshaya* may further favour *Vata* aggravation, generating a self-perpetuating cycle. Classical descriptions of teeth, nails, hair, pain, fragility and abnormal bony growth broaden the clinical field beyond a single modern diagnosis. **Discussion:** Contemporary bone-remodelling concepts provide useful analogies, but direct equivalence between *Vata* and neural regulation, or between *Asthi Kshaya* and osteoporosis, is methodologically unsound. **Conclusion:** *Vata*, *Asthi* and *Asthivaha Srotas* form a coherent systems-level model linking causation, tissue nutrition, transport and manifestation. This model supports early assessment, subtype-sensitive management and research based on operational *Ayurvedic* phenotypes.

Keywords: *Vata Dosha*; *Asthi Dhātu*; *Asthivaha Srotas*; *Asthipradoshaja Vikara*; *Asthi Kshaya*; *Samprapti*

1. INTRODUCTION:

Asthi Dhatu provides *dharana*-support, stability and maintenance of bodily form. Yet *Ayurveda* does not describe *Asthi* as an inert structural material. Its state depends on digestion, sequential tissue transformation, the functional integrity of its transporting channels and the regulatory influence of *Dosha*. This makes skeletal disease a systemic event: a clinical manifestation in bone may be preceded by disturbances in appetite, nutrition, bowel function, activity, sleep, ageing or chronic depletion. *Asthipradoshaja* Vikara therefore represent the consequences of disturbed *Asthi* rather than a single disease entity.

Among the *Dosha*, *Vata* has a distinctive association with *Asthi*. *Vata* is accepted as situated in *Asthi* and is responsible for movement, sensation, transport and the initiation of physiological activity. The same mobile, dry, light, rough and subtle properties that enable physiological movement can, when excessive, promote tissue depletion, instability, cracking, pain and degeneration. Conversely, reduction in dense and stable *Asthi* may allow *Vata* to become more prominent. This reciprocal association is often taught through Ashraya-Ashrayi Bhava, but it requires careful interpretation because *Vata* and *Asthi* do not always display the simple parallel increase or decrease described for other *Dosha-Dhatu* relationships.

Asthivaha Srotas adds a necessary transport and transformation dimension. *Srotas* are not merely gross ducts; they include functional pathways through which material is conveyed, transformed and made available to tissues. Disease can arise from obstruction, excessive flow, altered direction or structural compromise. A critical account must therefore integrate *Vata*, *Asthi*, *Agni* and *Srotas* rather than treating each as an isolated textbook heading. This review develops such an integrated *Samprapti* and considers its diagnostic, therapeutic and research implications.

2. AIM AND OBJECTIVES:

The aim is to critically analyse the interrelationship of *Vata Dosha*, *Asthi Dhatu* and *Asthivaha Srotas* in the development of *Asthipradoshaja* Vikara. The objectives are to:

- (i) review the classical physiology of *Vata* and *Asthi*;
- (ii) examine *Asthivaha Srotas*, its roots and patterns of dysfunction;
- (iii) construct an integrated, depletion- and growth-sensitive *Samprapti*;
- (iv) identify clinically relevant assessment and management principles; and
- (v) define responsible areas of dialogue with contemporary skeletal biology.

3. MATERIALS AND METHODS:

A critical narrative method was used. Concepts were drawn primarily from the *Charaka Samhita*, *Sushruta Samhita* and *Ashtanga Hridaya*, with attention to established commentarial readings and standard English translations. The review focused on passages concerning *Srotas*, *Asthi*, *Dhatu*-poshana, *Dhatu*-kshaya and *vridhhi*, *Vata*, Ashraya-Ashrayi Bhava and *Asthipradoshaja* disorders. Contemporary literature was used only to clarify possible research

interfaces such as bone remodelling, mechanotransduction, ageing and metabolic regulation. Because chapter and verse numbering can vary between editions, the references list identifies classical works and relevant sections; investigators should confirm exact verse locations in the edition adopted by their university or journal. [1-6]

4. CONCEPTUAL FOUNDATIONS:

4.1 *Vata Dosha*: physiological regulator and pathological driver:

Vata is predominantly associated with *Vayu* and *Akasha Mahabhuta*. Its canonical qualities-*ruksha*, *laghu*, *sheeta*, *khara*, *sukshma* and *chala*-explain both its reach and its capacity to disturb tissues. In physiological balance, *Vata* governs initiation of movement, respiration, circulation, excretion, speech, sensory-motor coordination and the distribution of nutrients. *Prana*, *Udana*, *Vyana*, *Samana* and *Apana* provide a functional map rather than separate substances. Of particular relevance, *Samana* participates in digestion and separation, *Vyana* distributes and coordinates, and *Apana* governs downward movement and elimination in the pelvic-colonic domain. [1,3]

Pathological *Vata* is frequently associated with *shula*, *bheda*, *toda*, *spandana*, *stambha*, *sankocha* and functional irregularity. These expressions are relevant to musculoskeletal practice because pain, stiffness, altered movement and progressive loss of tissue may coexist. *Rukshata* reduces lubrication and nourishment; *kharatva* is compatible with roughness and wear; *chalatva* favours instability; and *sukshmatva* enables widespread involvement. However, *Dosha Guna* should be used as explanatory clinical categories, not translated literally into histological properties.

4.2 *Asthi Dhatu*: formation, function and states of imbalance:

Asthi is the fifth *Dhatu* in the conventional sequence from *Rasa* to *Shukra*. Its formation is explained through the action of *Bhutagni* and *Dhatvagni* on the nutritive fraction arriving from the preceding tissue, particularly *Meda*. *Asthi-dhatvagni* determines whether the incoming substrate is transformed into stable tissue, subsidiary products and waste. Thus, adequate dietary mineral content alone cannot guarantee healthy *Asthi* within the *Ayurvedic* model: digestion, absorption, transport, metabolic transformation and tissue receptivity all matter. [1,3]

Dharana is the principal function of *Asthi*. It maintains the body's framework, protects vital structures and offers stable attachment for movement. *Asthi Sara* features-classically assessed through the quality and prominence of bones, teeth, nails and joints-indicate constitutional excellence rather than merely high bone mass. *Asthi Kshaya* is described through symptoms such as pain in bones and joints, looseness or falling of teeth and changes in hair, nails or beard, while *Asthi Vriddhi* may manifest as *adhyasthi* or *adhidanta*, indicating abnormal bony or dental growth. These two directions show why *Asthipradoshaja Vikara* cannot be understood solely as deficiency.

Nails and hair are discussed in relation to *Asthi* as waste or derivative products in several teaching traditions, while teeth occupy a close diagnostic relationship with *Asthi*. Interpretations

differ across texts and commentaries, so clinical use should emphasise the repeated association rather than insist on one anatomical equation. Changes in teeth, nails and hair may support an *Asthi* assessment, but are nonspecific and require consideration of nutrition, age, local disease and other *Dhatu*.

4.3 *Asthivaha Srotas*: transport, transformation and tissue field:

Srotas sustain the movement and exchange of *Dhatu* and their precursors. Charaka's *Srotas* framework links each tissue system to characteristic roots, causes of injury and manifestations of dysfunction. For *Asthivaha Srotas*, classical teaching commonly identifies *Meda* and *Jaghanasthi* as roots, drawing attention to both metabolic continuity and a structural pelvic locus. Sushruta's surgical description of *Srotoviddha* must not be conflated with Charaka's metabolic *Srotodushti*; the two perspectives are complementary but answer different questions. [1,2]

General *Srotodushti* patterns include *atipravritti* (excessive movement), *sanga* (obstruction or inadequate passage), *siragranthi* (structural alteration) and *vimargagamana* (movement through an abnormal path). Applied to *Asthi*, these patterns may be interpreted as disturbed availability, defective delivery, abnormal localisation or pathological structural change. Such application is inferential and disease-specific. The pathway is also functionally connected to *Medovaha Srotas*, *Pakwashaya* and *Purishavaha Srotas*: *Meda* precedes *Asthi* in *Dhatu* transformation, while *Pakwashaya* is a principal *Vata* location and bowel disturbance may accompany *Vata*-dominant depletion.

Table 1. Functional integration of *Vata*, *Asthi* and *Asthivaha Srotas*

Domain	Classical emphasis	Pathological implication	Clinical reading
<i>Vata Dosha</i>	Movement, transport, sensory-motor regulation; <i>ruksha</i> , <i>laghu</i> , <i>khara</i> and <i>chala</i> qualities	Excess promotes depletion, pain, instability and irregular function	Assess pain character, mobility, dryness, sleep, activity, age and bowel pattern
<i>Asthi Dhatu</i>	<i>Dharana</i> , bodily framework, teeth and nail associations	<i>Kshaya</i> produces loss of support; <i>vridhhi</i> may produce abnormal growth	Examine skeletal pain, teeth, nails, posture, deformity and constitutional <i>Sara</i>
<i>Asthivaha Srotas</i>	Tissue-specific conveyance and transformation; relation with <i>Meda</i> and pelvic structures	<i>Sanga</i> , <i>atipravritti</i> , <i>vimargagamana</i> or structural alteration	Assess nourishment, metabolism, localisation and progression
<i>Asthi-dhatvagni</i>	Transformation of the <i>Asthi</i> -nourishing fraction	Defective quantity or quality of tissue formation	Integrate appetite, digestion, <i>Dhatu</i> signs and chronicity

5. CRITICAL ANALYSIS OF *VATA-ASTHI SAMBANDHA*:

Ashraya-Ashrayi Bhava describes the relationship between a *Dosha* and its supporting tissue or site. In many pairings, measures that increase a *Dosha* may also increase its related *Dhatu*. *Vata-Asthi* is frequently presented as a notable exception: *Vata* aggravation is associated with *Asthi* depletion, while *Asthi*-supporting, unctuous and nourishing measures generally pacify

Vata. This inverse clinical tendency is best understood through *Guna*. Dense, stable and hard *Asthi* contrasts with mobile, light, dry and rough *Vata*. When *Vata* qualities dominate, the tissue loses stability and nourishment; when *Asthi* is depleted, the relative expression of *Vata* qualities becomes greater. [1,3-6]

The relationship is reciprocal but not mechanically symmetrical. *Vata Vriddhi* can impair digestion, disturb distribution, alter bowel function, increase catabolism-like depletion and generate pain. *Asthi Kshaya* can then reduce the stable substrate that contains *Vata*, allowing further mobility and irregularity. Ageing is a natural *Vata*-predominant period and simultaneously a period in which tissue recovery and structural resilience decline, making the cycle clinically visible. Trauma, excessive exercise, fasting, sleep loss and chronic illness can accelerate it.

Nevertheless, not every *Asthi* disorder is *Vata-Kshaya* dominant. Abnormal growth, swelling, obstruction, inflammatory states, congenital abnormalities and secondary involvement of *Pitta* or *Kapha* require different explanations. *Adhyasthi* and *adhidanta* indicate that disordered *Asthi* formation may be excessive or misdirected. The critical position, therefore, is that *Vata-Asthi* reciprocity is a powerful default model for degeneration but not a universal substitute for complete *Dosha-Dushya* assessment.

6. ASTHIPRADOSHAJA VIKARA: SCOPE AND CLASSIFICATION

Pradosha denotes impairment or pathological alteration of a tissue. *Asthipradoshaja* Vikara are conditions arising when *Asthi* is vitiated or inadequately formed. Classical lists include abnormalities of teeth, nails and hair; pain or splitting sensations in bones and joints; and excessive or additional bone and teeth. The lists are clinically heterogeneous because they classify disease by affected *Dhatu* rather than by a single organ, cause or modern diagnostic label.

For analysis, these manifestations can be grouped into five domains. First, depletion and fragility include loss of structural strength and susceptibility to injury. Second, pain and functional limitation include bone or joint pain, cracking and impaired movement, often with *Vata* predominance. Third, dental and keratin-associated signs include looseness, loss or abnormality of teeth, nails and hair. Fourth, growth disorders include *adhyasthi* and *adhidanta*. Fifth, mixed or secondary presentations may combine inflammation, obstruction, trauma or systemic disease. Grouping by phenotype helps avoid the misleading assumption that all *Asthipradoshaja* Vikara are osteoporosis.

Table 2. Clinically useful phenotyping of *Asthipradoshaja* manifestations

Phenotypic group	Indicative <i>Ayurvedic</i> features	Dominant mechanism to examine	Important caution
<i>Kshaya</i> -dominant	<i>Asthi</i> or <i>sandhi</i> pain, reduced support, dental looseness, fragility-like tendency	<i>Vata Vriddhi</i> , under-nutrition, weak <i>Agni/Dhatvagni</i> , age-related depletion	Do not diagnose osteoporosis from <i>Ayurvedic</i> signs alone

Phenotypic group	Indicative <i>Ayurvedic</i> features	Dominant mechanism to examine	Important caution
<i>Vata</i> -pain dominant	<i>Toda, bheda, shula</i> , stiffness, variable pain and impaired movement	<i>Ruksha-khara-chala</i> predominance; local <i>Khavaigunya</i>	Exclude trauma, neurological and inflammatory causes
Growth dominant	<i>Adhyasthi, adhidanta</i> or local hard overgrowth	Abnormal or misdirected tissue formation; obstruction may coexist	Not all hard masses are <i>Asthi Vriddhi</i>
Accessory-tissue signs	Changes in teeth, nails or hair	Long-standing tissue nutrition disturbance	Signs are nonspecific and need differential assessment
Mixed/secondary	Pain with swelling, heat, heaviness or systemic features	<i>Pitta, Kapha, Ama</i> , trauma or another primary disease	Avoid <i>Vata</i> -only treatment logic

7. INTEGRATED ETIOPATHOGENESIS:

7.1 *Nidana* and *Dosha* activation:

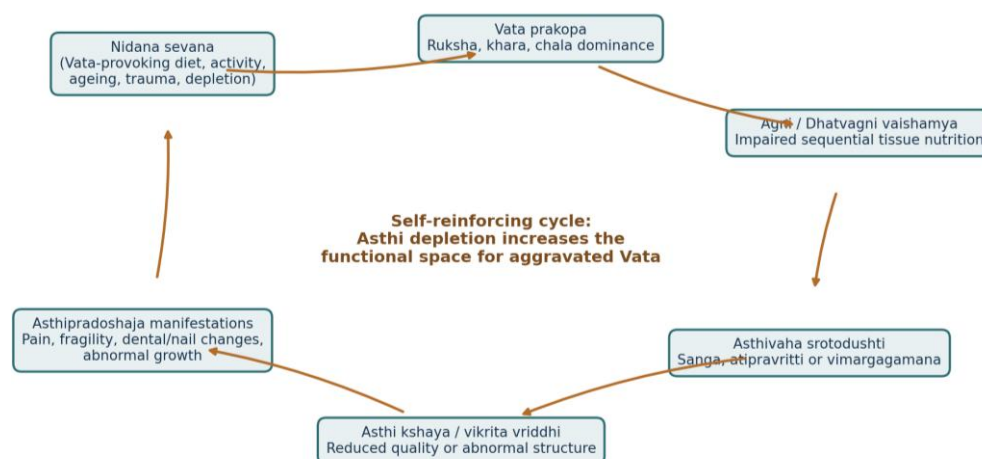
Relevant *Nidana* include insufficient or irregular food, excessive fasting, dry and light diets, over-exertion, repetitive loading without recovery, trauma, disturbed sleep, fear or chronic stress, ageing and prolonged illness. These factors need not act identically. Some primarily provoke *Vata*, some reduce the quantity of nourishing substrate, some injure a local structure, and others impair *Agni*. Their convergence determines whether disease is generalised, focal, acute or chronic.

7.2 *Agni, Dhatu-poshana* and *Srotas*:

Jatharagni disturbance may reduce the quality of *Ahara Rasa*, while *Dhatvagni* disturbance affects tissue-specific transformation. If *Meda-to-Asthi* transformation is inadequate, the incoming fraction may be insufficient, poorly processed or unable to reach the target field. *Srotodushti* adds a transport defect: *sanga* limits availability, *atipravritti* represents excessive or wasteful movement, and *vimargagamana* suggests abnormal localisation. *Ama* may participate where incomplete transformation, heaviness, coating, loss of appetite or inflammatory-metabolic features are present, but it should not be inserted automatically into every degenerative *Samprapti*.

7.3 Localisation and self-perpetuation:

Aggravated *Dosha* circulate and localise where *Khavaigunya* exists. Previous injury, congenital weakness, repetitive mechanical stress, poor posture or age-related vulnerability can provide such a site. Once located in *Asthi* or *Sandhi*, *Vata* may produce pain, cracking, instability and depletion. Reduced *Asthi* stability then reinforces *Vata* expression. In growth-dominant conditions, disturbed transformation and obstruction may instead yield excessive or misdirected hard tissue. The resulting phenotype depends on *Dosha* combination, tissue strength, chronicity and the direction of *Srotodushti*.

Figure 1. Integrated and self-reinforcing *Samprapti* of *Asthipradoshaja* Vikara

Interpretive note: the cycle is a synthesis of classical principles, not a verbatim flowchart from a single *Samhita*. Individual disorders may enter the pathway at different points and may involve *Pitta*, *Kapha*, *Ama* or trauma.

8. *SAMPRAPTI GHATAKA*:

Table 3. General *Samprapti* Ghataka for *Asthipradoshaja* Vikara

Component	Likely involvement	Critical qualification
<i>Dosha</i>	<i>Vata</i> , especially <i>Vyana</i> / <i>Apana</i> functions; <i>Pitta</i> or <i>Kapha</i> may associate	Determine from the actual phenotype, not the tissue name alone
<i>Dushya</i>	<i>Asthi</i> ; frequently <i>Sandhi</i> , <i>Majja</i> , <i>Meda</i> and related structures	Accessory signs may involve several <i>Dhatu</i>
<i>Agni</i>	<i>Jatharagni</i> and <i>Asthi-dhatvagni</i> ; preceding <i>Dhatvagni</i> may contribute	<i>Agni</i> status can be variable, <i>manda</i> or irregular
<i>Ama</i>	Possible in incomplete transformation or mixed inflammatory-metabolic states	Not compulsory in pure <i>Kshaya</i>
<i>Srotas</i>	<i>Asthivaha</i> ; possible <i>Medovaha</i> and <i>Purishavaha</i> association	Connections are functional and patient-specific
<i>Srotodushti</i>	<i>Sanga</i> , <i>atipravritti</i> , <i>vimargagamana</i> or structural alteration	Specify the inferred pattern and supporting signs
Udbhava sthana	<i>Amashaya</i> / <i>Pakwashaya</i> according to <i>Dosha</i> and <i>Agni</i> sequence	May differ by disease and dominant <i>Dosha</i>
<i>Sanchara</i> / <i>Adhishthana</i>	Systemic circulation with localisation in <i>Asthi</i> , <i>Sandhi</i> or a vulnerable site	Prior trauma and <i>Khavaigunya</i> influence localisation
<i>Rogamarga</i>	<i>Madhyama Rogamarga</i> is commonly relevant	Local oral or superficial signs may require broader interpretation
Nature	<i>Chirakari</i> and <i>Kricchrasadhya</i> tendencies in advanced depletion	Prognosis depends on age, <i>Bala</i> , chronicity and reversibility

9. CLINICAL AND DIAGNOSTIC IMPLICATIONS:

A useful assessment begins before overt skeletal failure. History should identify *Vata*-provoking exposures, dietary adequacy, appetite, bowel pattern, sleep, menstrual or endocrine context where relevant, prior fractures or trauma, medications, family history and ageing.

Dashavidha and *Ashtavidha Pariksha* provide an *Ayurvedic* frame: *Prakriti*, *Vikriti*, *Sara*, *Samhanana*, *Satmya*, *Ahara-shakti*, *Vyayama-shakti*, *Vaya*, *Nadi*, *Mala* and other observations help estimate susceptibility and current state. *Asthi Sara* is constitutional; *Asthi Kshaya* is pathological; the two should not be confused.

Examination should include posture, gait, range of motion, focal tenderness, swelling, deformity, dental status and nail quality. Pain descriptors help identify *Vata* features, while heat, redness and burning suggest *Pitta* association and heaviness or marked swelling may suggest *Kapha* or *Ama*. Laboratory tests and imaging are appropriate when fracture, infection, malignancy, inflammatory arthritis, metabolic bone disease or neurological compromise is possible. *Ayurveda*-based assessment complements rather than replaces biomedical diagnosis in such settings.

Clinical reasoning should distinguish *Kshaya*-dominant from *Vridhhi*- or obstruction-dominant states. A patient with low body mass, dryness, variable appetite, constipation, insomnia and diffuse pain differs fundamentally from one with a local hard outgrowth or painful swollen joint. The *Dhatu* label identifies the field; *Dosha*, *Agni*, *Ama*, *Srotodushti*, *Avastha* and *Bala* determine the treatment direction.

10. THERAPEUTIC IMPLICATIONS:

Nidana *Parivarjana* is primary. Correctable contributors-under-nutrition, overtraining, repetitive injury, irregular meals, inadequate sleep and bowel disturbance-should be addressed. In *Kshaya* with *Vata* predominance, *Brimhana*, *Snehana* and appropriately nourishing diet are logically indicated, provided *Agni* can process them. If *Agni* is weak or *Ama* is evident, immediate heavy nourishment may be poorly tolerated; staged *Deepana*-*Pachana* and correction of the channel disturbance may be required before substantial *Brimhana*.

Basti is central to *Vata* management because of its action through the *Pakwashaya* domain and its systemic relevance in classical therapeutics. *Ksheera*, *Sneha* and *Tikta-dravya* combinations are traditionally discussed for *Asthi*-related conditions: *Tikta* is associated with *Asthi*, while milk and unctuous media counter dryness and support nourishment. The apparent opposition between the drying tendency of *Tikta* and the need for *Brimhana* is resolved by formulation, vehicle, dose, patient strength and disease stage. This principle should guide supervised clinical reasoning rather than self-medication.

Local *Snehana*, cautious *Swedana*, external therapies and rehabilitation may support pain relief and movement, but excessive heat or vigorous procedures can aggravate depletion or acute inflammation. Growth-dominant, obstructive, traumatic or *Pitta-Kapha*-associated conditions demand modification. *Rasayana* and long-term dietary measures are most credible when digestion, sleep, physical loading and adherence are simultaneously addressed. Severe pain, neurological deficit, suspected fracture, fever, weight loss or rapidly progressive deformity requires timely biomedical evaluation.

11. CONTEMPORARY INTERPRETATION: OPPORTUNITIES AND LIMITS:

Bone is a dynamic tissue continuously remodelled through coordinated resorption and formation. Mechanical loading, endocrine signals, nutrition, inflammation, ageing and neural regulation influence this process. These findings resonate with the *Ayurvedic* view that *Asthi* depends on transformation, distribution, use and systemic regulation. The *Meda-Asthi* sequence also invites research into relations among adipose biology, marrow, metabolism and bone; however, the *Dhatu* sequence is a functional-metabolic doctrine and should not be rewritten as a literal biochemical pathway. [7-9,12]

Asthi Kshaya may overlap phenotypically with low bone mass, degenerative change, frailty or nutritional deficiency, yet it is not synonymous with any one of them. Likewise, *Vata* cannot be equated with the nervous system, catabolism or movement alone. Such one-to-one translation discards the clinical breadth of *Dosha* and creates false claims of validation. A stronger integrative method identifies comparable functions, tests operational variables and preserves differences in ontology. [10,11]

Research can examine whether a reproducible *Vata-Asthi* phenotype predicts pain, fracture risk, bone density, turnover markers, muscle function or quality of life. Classical signs could be converted into a transparent assessment instrument and tested for reliability, construct validity and responsiveness. Mechanistic studies might explore digestion, dietary patterns, microbiome-bowel variables, body composition, physical activity and inflammatory markers without assuming in advance that any biomarker is *Asthi-dhatvagni*. This approach permits dialogue while protecting conceptual integrity. [7-12]

12. DISCUSSION:

The central finding of this review is that *Asthipradoshaja* pathology is best understood as an interaction among regulation, tissue transformation, transport and structural expression. *Vata* explains movement, pain and the tendency toward depletion; *Asthi* identifies the structural tissue field; *Asthivaha Srotas* explains how nourishment and pathology reach that field; and *Asthi-dhatvagni* explains tissue-specific transformation. Removing any one component produces an incomplete account. A bone-centred interpretation overlooks systemic causation, while a *Vata*-only interpretation overlooks abnormal growth, mixed *Dosha* and local structural disease.

The inverse *Vata-Asthi* tendency is especially useful in chronic degeneration. *Ruksha*, *laghu*, *khara* and *chala* qualities provide a coherent bridge from exposure to symptoms: fasting, insufficient recovery and ageing increase *Vata*-like qualities; appetite and distribution become irregular; tissue stability decreases; pain and mobility disturbance follow; and the depleted tissue further fails to contain *Vata*. This is a clinically meaningful feedback model, although it remains an *Ayurvedic* explanatory construct rather than a demonstrated molecular loop.

Asthivaha Srotas prevents the model from becoming static. Tissue disease is not only a question of how much *Asthi* exists but whether precursors are adequately processed, delivered and localised. The association with *Meda* highlights metabolic continuity, while the relation to

Pakwashaya and elimination highlights the *Vata* domain. Yet textual plurality must be respected: Charaka's functional-metabolic *Srotas* and Sushruta's anatomical-surgical concerns are neither identical nor mutually exclusive. Critical scholarship should state which textual frame is being used.

The review also exposes several methodological problems in current integrative writing. Classical lists are often selectively quoted to support a modern diagnosis; Sanskrit terms are translated differently across papers; assessment criteria are rarely validated; and formulations are studied without a sufficiently defined *Ayurvedic* phenotype. Future work should pre-specify textual definitions, record *Dosha-Dushya* and *Agni* variables, distinguish *Kshaya* from *Vridhhi*, and report concurrent diet, activity and biomedical treatment. This would make findings more interpretable and reproducible.

A limitation of this narrative review is that it does not constitute a systematic search or formal evidence grading. Classical interpretations vary by commentary and institutional tradition, and the English renderings used here cannot substitute for direct textual study. Contemporary parallels are hypothesis-generating. The article's value lies in synthesis: it offers a transparent framework that can be refined through textual scholarship, consensus methods and prospective clinical research.

13. RESEARCH PRIORITIES:

Five priorities emerge: development and validation of an *Asthi Kshaya/Asthivaha Srotodushti* assessment scale; Delphi consensus on minimum diagnostic criteria; prospective studies relating *Ayurvedic* phenotypes to bone density, turnover, falls and function; trials stratified by *Kshaya*, *Ama* and *Dosha* association rather than diagnosis alone; and longitudinal evaluation of diet, *Basti*-based protocols, rehabilitation and *Rasayana* within ethically supervised integrative care. Reporting should include adverse events, co-interventions and biomedical red flags.

14. CONCLUSION:

Vata Dosha, *Asthi Dhatu* and *Asthivaha Srotas* constitute an interconnected *Ayurvedic* model of skeletal physiology and disease. Physiological *Vata* supports movement and transport; aggravated *Vata* may disturb digestion, distribution and tissue stability. *Asthi-dhatvagni* and *Asthivaha Srotas* determine the transformation and availability of the *Asthi*-nourishing fraction. When these processes are impaired, *Asthi* may become depleted, painful and unstable or may develop abnormal growth. *Asthi Kshaya* can in turn favour further *Vata* expression, creating a clinically important feedback cycle. The model supports early assessment of diet, *Agni*, bowel function, activity, age, tissue quality and local vulnerability, while requiring differentiation of *Kshaya*-, *Vridhhi*-, obstruction- and mixed-*Dosha* presentations. Responsible contemporary interpretation should seek functional parallels without claiming exact equivalence with osteoporosis or any single biomedical mechanism. Carefully operationalized *Ayurvedic* phenotypes, verified textual scholarship and well-designed clinical studies are required to

convert this conceptual strength into reproducible evidence and patient-centered integrative practice.

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19. ETHICAL APPROVAL: Not required for this critical narrative review.

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