Review Article

www.ijrap.net

(ISSN Online:2229–3566, ISSN Print:2277–4343)

UNDERSTANDING DHATUKSHAYA THROUGH THE LENS OF PRAMEHA: A COMPREHENSIVE REVIEW

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Received on: 25/2/25 Accepted on: 28/3/25

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DOI: 10.7897/2277-4343.16273

ABSTRACT

Dhatukshaya, or the depletion of bodily tissues, is a fundamental concept in *ayurveda* that highlights the progressive degeneration of the seven dhatus. Prameha progresses through stages linked to the tridosha: kapha in early stages, pitta in intermediate stages, and vata in advanced stages, exacerbating degeneration due to dhatu shitilata (tissue laxity) and obstruction in the srotas. The pathogenesis of prameha involves derangement of doshas, subsequent impairment of dhatwagni, and metabolic disturbances in the dhatus, which in turn disrupt normal carbohydrate, fat, and protein metabolism. These further damages the tissues and impacts the mutravaha srotas (urinary system). Prameha progressively affects multiple dhatus (tissues) including rasa, meda, and majja, leading to symptoms such as polyuria, polydipsia, polyphagia, fatigue, dryness, and neuropathy. Tissue depletion disrupts nourishment, fluid balance, and energy reserves, resulting in systemic complications over time. Diabetes Mellitus has become a major global health concern, causing extensive numerous cellular damages in different organs at various stages of the disease. Diabetes contributes or accelerates the process of degeneration by chronic hyperglycemia, oxidative stress, advanced glycation end products (AGEs), inflammation and immune dysregulation.

Keywords: Dhatukshaya, Prameha, Degeneration, Diabetes.

INTRODUCTION

The word Dhatukshaya comprises of two words, dhatu and kshaya. Dhatu refers to that which helps in shareera dharana (sustenance of body) and are 7 in number. Kshaya refers to ksheenata (reduction). Each dhatu (bodily tissue) is nourished by following a meal with the influence of its respective jataragni (digestive energy). After digestion, the nutrients (ahara rasa) derived from food sustain each level of dhatu. All nutrients needed for the synthesis and growth of every tissue originate from a single pool and are transported to their respective dhatu. The metabolic energy of each tissue (dhatvagni) governs its nourishment and promotes the growth of the corresponding tissue as well as its dependent tissues (upadhatus*)*. Each dhatvagni also ensures the supply of essential nutrients to subsequent tissues, enhancing their ability to regenerate. Any alteration in the potency of dhatvagni at any level can disrupt the creation and nourishment of the subsequent dhatu. Dhatukshaya could be caused by kevalavataja, avaranaja or avarana leading to dhatukshaya.

Prameha is a tridosha prakupita santharpanajanya vyadhi (a disorder caused by the aggravation of all three doshas and overnutrition.). It is mainly classified into 2 types i.e., Sahaja and Apathyanimittaja, or Dhatukshayajanya and Avaranajanya. According to Acharya Sushruta, it is an aamajanya vyadhi[1]. Due to *nidana* (causative factors), bahudrava kapha vitiates abaddha ghana medas and spreads throughout the body, aggravating the remaining doshas. This in turn leads to the vitiation of dushyas, which are then eliminated through the basti[2].

PRAMEHA: A PATHWAY TO DHATUKSHAYA

Prameha is a mandagni janya vyadhi (due to impaired digestive and metabolic fire), leading to the formation of apachita medas. As a result, it fails to provide nourishment to uttarottara dhatus (subsequent dhatus)[3] leading to improper formation of asthi (bone), majja (bone marrow) and other dhatus, thereby contributing to degeneration. This condition arises due to various metabolic errors in the dhatus, caused by the deficiency of certain dhatwagni's. These metabolic disturbances are often triggered by unwholesome dietary habits and a sedentary lifestyle. Due to ahitakara aahara and paana (unwholesome diet), the proper formation of dhatuvyuha samucchay is hindered, which may eventually lead to dhatukshaya[4]. Kapha is composed of pruthvi and jala mahabhuta, where pruthvi is responsible for providing structural compactness. However, in Prameha, due to bahudrava kapha, and excessive kleda, the sthirata (stability) of medas is not achieved. This results in dhatu shitilata (tissue laxity), ultimately resulting in degeneration. In Avaranajanya prameha, the disease gradually progresses to dhatukshaya over time[5].

Kaphaja Prameha gradually transforms into Pittaja Prameha, and if left untreated further progresses into Vataja Prameha. As the disease progresses, improper management or persistent nidana (causative factors) can cause the kapha dosha to aggravate other doshas, primarily pitta. Through kapha-pitta interaction, agni (digestive/metabolic fire) becomes further impaired, leading to an accumulation of pitta. The vitiated kapha and meda (fat) obstruct the normal metabolic pathways, causing Pitta to localize and aggravate. This results in the development of Amlabhava (acidic state) due to increased pitta. As Kapha becomes less dominant, Pitta takes over, leading to Pittaja Prameha. Long-standing Pittaja Prameha eventually leads to severe dhatu depletion, as the aggravated Pitta weakens kapha, allowing vata to become predominant. Vata naturally increases when dhatus (body tissues) are excessively depleted (dhatu kshaya) and when there is reduced support from kapha and pitta. Due to it's inherent laghu (light) and dry (ruksha) properties, aggravated vata further worsen the existing dhatu kshaya. This disrupts the normal functioning of mutravaha srotas (urinary channels), leading to abnormal and frequent urination.

Prameha is a santarpanottita vikara (a disorder caused due to over nourishment)[6]. According to Acharya Sushruta, over nourishment (due to aavarana) eventually leads to Vatavyadhi (dhatukshaya) over a period of time[7]. From this we can infer that the state of degeneration is closely related to Prameha. In Prameha, degenerative changes occur due to the progressive depletion and dysfunction of tissues. The dushya's involved in the manifestation of prameha are rasa, rakta, mamsa, medas, majja, shukra, vasa, lasika, kleda, and ojas[8]. Although asthi (bone) is not directly involved in the pathogenesis of prameha, it serves as the ashrayasthana for Vata dosha which plays a significant role in the samprapti (pathogenesis) of prameha.

ANALYZING DHATUKSHAYA BY PRAMEHA LAKSHANA

Table 1: Assessing dhatukshaya by Prameha lakshana

Dhatu kshaya	Prameha lakshana
Rasa dhatu	shosha (dehydration), swalpacheshtasya shrama (fatigue), rukshata (dryness), trishna (polydypsia), reduced appetite.
Rakta dhatu	rukshata, agnimandya, sheetapriyata, shitilatha, pallor, dizziness, weakness.
Mamsa dhatu	roukshya, sada, akshaglani, muscle wasting weakness.
Meda dhatu	rukshata, krishata (Weight loss).
Asthi dhatu	rukshata, asthi toda, dourbalya, weak bones, joint pain.
Majja dhatu	asthi soushirya, timira, fatigue, decreased immunity, joint pain.
Shukra dhatu	sadana, dourbalya, shosha, maithuna ashakti, shukra avisarga, infertility, impotence, low libido.

Diabetes mellitus is a group of diseases characterized by hyperglycemia. Type 1 diabetes is a disorder due to beta cell failure, resulting in reduced or absence of insulin production. This condition can be correlated with dhatukshayajanya prameha. Type 2 diabetes occurs due to insulin resistance and decreased insulin secretion, which can be correlated with avaranajanya prameha. Classical symptoms of diabetes are polydipsia (excess thirst), polyuria (frequency of micturition) and polyphagia (excess hunger). Often, the diagnosis of diabetes is accompanied by weight loss.

The possible dhatu kshaya involved in polyuria is rasa dhatu (rasa dhatu depletion is also linked to excessive loss of water through urine). The possible dhatu kshaya involved in polydipsia is rasa dhatu which is a primarily formed dhatu after the process of aaharapaaka, and responsible for nourishment of body. Polydipsia occurs when the body experiences dehydration or improper fluid regulation. The possible dhatu kshaya involved in polyphagia are rasa dhatu (If the first dhatu is depleted, it can affect the body's ability to distribute nutrients, leading to persistent hunger), medo dhatu (The depletion of fat tissue leads to an imbalance in energy reserves, resulting in an excessive desire to eat to compensate). Weight loss suggests depletion of rasa dhatu and meda dhatu.

ANALYZING DHATUKSHAYA BY PRAMEHA UPADRAVA

Diabetes mellitus adversely affects the functioning of almost every organ in the human body over time. The disease prameha can be categorized into three stages based on the severity of dhatudusti (tissue impairment). In the first, second, and third stages, Kaphaja, Pittaja, and Vataja symptoms are manifested respectively. Prameha Upadravas (complications of Prameha) typically appears in the terminal stage, characterized by the dushti (impairment) of all dhatus. According to Vagbhata, madhumeha is a chronic and progressive stage of prameha, classified into two types: avaranajanya and dhatukshyajanya. Madhumeha is a Vataja type of Prameha, where Vata can be aggravated through two mechanisms: avarana (obstruction) and kshaya (depletion). Avritta vatajanya madhumeha, caused by obstruction, is considered difficult to cure (krichhrasadhya), while dhatukshyajanya madhumeha, caused by tissue depletion, is deemed incurable (asadhya)[9]. As per Charaka, the term "prameha anushanginam" indicates that diabetes is concomitant in nature, meaning it persists alongside its complications. Both avarana and dhatukshya lead to the depletion of all ten dushyas, producing symptoms based on the affected dhatu.

Table 2: Assessing dhatukshaya by Prameha upadrava

Dhatu kshaya	Upadrava
Rasa dhatu	kampa, trishna
Rakta dhatu	amlika, shaithilyata
Mamsa dhatu	shosha
Meda dhatu	badda purisha
Asthi dhatu	shaithilya
Majja dhatu	timira
Shukra dhatu	pandu, shosha, dourbalya, bastimeha toda, mushkavadharana

Diabetic neuropathy is one of the major complications of diabetes. According to Ayurveda, in both avaranjanya (obstructive) and kshayajanya (degenerative) stages, the proper functioning of Vyana Vayu is disrupted leading to the signs and symptoms of diabetic neuropathy. The decline in the chala guna (mobility) of Vata is caused by the avarana of Kapha and Pitta, which impairs neuronal signaling and exacerbates the degeneration of the myelin sheath. This condition represents a Vata-Pitta dominant stage of prameha, where vitiated Vata transforms into Madhumeha, leading to the degeneration of the nerve's myelin sheath and pathological brittleness in the body. As it is margavarodhajanya vyadhi, proper nourishment of dhatus is hindered, further worsening the condition. Diabetic neuropathy can be associated with majja dhatu kshaya. When it undergoes depletion, symptoms such as numbness, tingling, burning sensation, or loss of sensation in the extremities may manifest, which are the hallmark symptoms of diabetic neuropathy.

In the case of diabetic retinopathy, the primary affected dhatu is rakta (blood), although all dhatus are involved. The main affected srotas (channels) are raktavaha (blood-carrying), mamsavaha (muscle-carrying), and medovaha (fat-carrying) srotas. Sirasaithilya is one of the major signs of raktakshaya (first patala consists of rasa and rakta dhatu). Loss of pericytes and formation of microaneurysms are earliest signs of Diabetic Retinopathy.

Dhamanisaithilya a feature of mamsakshaya, (2nd patala comprises sookshma rupi mamsa dhatu) can be correlated with endothelial cell loss caused by improper apoptosis and capillary degeneration. This process leads to an early breakdown of the blood-retinal barrier, manifesting as signs such as dot/blot or flame-shaped haemorrhages. Sandhishunyata, a feature of Medakshaya (The 3rd patala, composed of meda dhatu), can be correlated with the loss of junctional cell proteins or defects in cell adhesion, leading to a breakdown of the blood-retinal barrier (BRB). Prominent signs at this stage include macular edema and exudate formation. The 4th patala, drishtipatala is asthyashrita in nature, and the depletion of asthi and majja dhatu results in the manifestation of symptoms associated with 4th patalagata timira. Timiradarshana is one of the symptoms of majjakshaya*,* which subsequently leads to vata kshaya. The depletion of marrow tissue results in reduced blood cell formation, creating hypoxic conditions for retinal neurons. In the later stages, when shukra dhatu is affected, signs such as retinal paleness and optic atrophy appear. Panduta*,* a characteristic feature of shukrakshaya[10].

Diabetic nephropathy is a chronic kidney disease caused by prolonged and poorly managed diabetes. Prameha is a condition characterized by an imbalance of the tridoshas in the body. Kleda is eliminated from the body through urine, primarily processed by the kidneys. In prameha, the madhuryata in kleda increases due to its similarity to the kapha dosha*,* imparting a guru guna to kleda*.* Consequently, this leads to the impaired function of the mutravaha srotas, gradually causing a decline in kidney function. This impaired kidney function prevents the effective removal of kleda from the body, resulting in its accumulation either in sthanika (specific areas) or sarvadehika (throughout the entire body). This leads to the manifestation of symptoms such as *"*Nipeeditho na cha unnamati" (difficulty in movement due to excess fluid retention). Subsequently, vata dosha leads to shoshana (drying) of kleda in the mutrashaya (urinary bladder), contributing to the symptoms of nephropathy. The possible dhatu kshaya involved in diabetic nephropathy are rasa dhatu, rakta dhatu (high blood sugar levels impair circulation and oxygen delivery, leading to vascular damage and microangiopathy in the kidneys), meda dhatu (diabetes is closely linked to fat metabolism. Excessive or improper metabolism leads to abnormal lipid levels and increased fat deposition in kidney tissues). Proteinuria is a hallmark symptom of nephropathy, which suggests mamsa dhatukshaya (Indicates weakness or damage in the muscles, which may correlate to protein leakage from the kidneys) and medo dhātu kṣhaya (Imbalance in fat metabolism could lead to improper filtration in the kidneys, causing protein loss).

DISCUSSION

Degeneration is a continuous process involving degenerative cellular changes that affect tissues or organs, leading to their progressive deterioration over time. This deterioration may occur due to normal bodily wear and tear or as a consequence of maladaptive lifestyle factors. Most of the Degenerative diseases are typically associated with metabolic issues, endocrine pathology, vascular insufficiencies, adrenocortical deficiencies, and an increased rate of connective tissue degeneration.

Diabetes mellitus is a major global burden.The prevalence of diabetes is rising globally due to lifestyle changes, urbanisation, and an increase in obesity. Adequate levels of insulin are essential for normal bone growth. Along with growth hormone, insulin promotes growth of body by its anabolic action on proteins. It enhances the transport of amino acids into the cell and synthesis of proteins in the cells. It also has the protein-sparing effect, i.e. it causes conservation of proteins by increasing the glucose utilization by the tissues. Poorly controlled diabetes mellitus leads to impaired skeletal growth and mineralization. Accumulation of advanced glycosylated end products (AGEs) decrease bone mineral acquisition in Type 1 diabetes. Type 2 diabetes is associated with normal bone mass but increased skeletal fragility is due to enhanced cortical porosity and AGE's in the matrix. In nonobese type 2 diabetes mellitus, the increased resistance to insulin is caused by a fault in the post receptor stage of insulin metabolism in the peripheral cells, rather than by an abnormality in the number or avidity of the receptors for insulin. DM affects both somatic and autonomic fibers of the peripheral nervous system, causing sensory-motor and neurovegetative multiorgan manifestations due to impaired sympathetic/parasympathetic conduction, Hyperglycemia and reduced oxygen delivery through the vasa nervorum lead to inflammatory damage and leads to altered nerve activity.

CONCLUSION

The link between diabetes and degeneration is multi-faceted, involving oxidative stress, inflammation, vascular damage, and metabolic dysfunction. Preventive and therapeutic approaches that focus on controlling blood glucose levels, reducing oxidative stress, and improving tissue health can help mitigate degenerative changes in diabetic individuals. Core mechanism for both Prameha and degeneration is chronic inflammation. Modern science identifies cellular energy deficits (mitochondrial dysfunction) in degeneration, which Ayurveda might interpret as weak agni. Deranged agni is the basic cause for prameha and degeneration. Hence correction of agni is the prime treatment. In Prameha only malabhuta dhatu increases in the body not the prasada amsha. This leads to dhatu excretion through urine and causes dhatukshaya. By integrating pathya aahara, vyayama, shamana, shodhana and rasayana chikitsa helps to overcome degeneration induced by prameha.

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Cite this article as:

Shilpa KG, Manjunatha Adiga and Amritha E Pady. Understanding dhatukshaya through the lens of Prameha: A Comprehensive Review. Int. J. Res. Ayurveda Pharm. 2025;16(2):209-212 DOI: http://dx.doi.org/10.7897/2277-4343.16273

Source of support: Nil, Conflict of interest: None Declared