

Severe Hypovitaminosis D with Co-existing Anaemia (*Pandu*) Managed with Lifestyle Modification and Ayurvedic Intervention: A Case Report

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ABSTRACT

Hypovitaminosis D, a commonly found micronutrient deficiency characterised by musculoskeletal pain, fatigue and declining functional capacity, which, when co-exists with anaemia (*Pandu*), it represents signs of impaired metabolism and nourishment of tissues rather than a pure isolated deficiency state. A 22-year-old female patient, presented with complaints of bilateral calf muscle myalgia of one month duration, associated with fatigue, anorexia, generalised weakness, weight gain along with hair fall. She had a history of irregular and heavy menstrual bleeding and was diagnosed with anaemia six years ago. Clinical examination showed pallor and koilonychia and laboratory investigations revealed severe hypovitaminosis D, with serum 25-hydroxyvitamin D level of 7.5 ng/mL and mild anaemia with haemoglobin 10.1 g/dL. Serum calcium, vitamin B12 and thyroid-stimulating hormone levels were within normal limits. The therapeutic strategy was designed to correct impaired metabolism and utilisation of nutrients rather than providing direct vitamin D or iron supplementation. She was administered with *Trayushnadi Loha Vati* (500 mg BD) for 51 days, with advice on regular morning sun exposure along with dietary adjustment. Monthly follow-up was carried-out to assess compliance and clinical response. At the end of treatment course, significant improvement was reported in subjective as well as objective parameters with reduction in Visual Analogue Scale (VAS) score from 8 to 2, improvement in haemoglobin levels to 11.3 g/dL and normalisation of serum 25-hydroxyvitamin D levels to 75.9 ng/mL. No adverse effects were reported. This case highlights the potential role of metabolism-centred Ayurvedic approach in the management of severe hypovitaminosis D with co-existing anaemia.

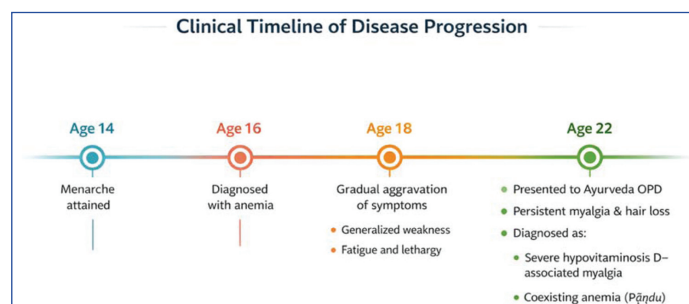
Keywords: Musculoskeletal pain, Nutrition disorders, Sunlight exposure, Vitamin D deficiency

CASE REPORT

A 22-year-old female patient presented to Department of Kayachikitsa with chief complaints of myalgia (pain) predominantly involving calf muscles for one month. Pain was dull aching in nature, continuous and aggravated by sustained standing and walking. Associated features were fatigue and generalised weakness which was present since approximately six months, along with hair fall and weight gain. During the presentation, her Body Mass Index (BMI) was 23.8 kg/m², which was within the normal range, but she reported a recent weight gain of around 4-5 kg over the last 4-5 months compared to her usual weight. Patient reported reduced functional capacity marked by inability to perform daily household work, as well as academic activities, which was evaluated during baseline by structured clinical history taking, Functional Assessment of Chronic Illness Therapy-Fatigue (FACIT-F) scale (assessing fatigue impact, lower scores indicate severe limitation) as well as World Health Organisation Quality of Life-Brief Version (WHOQOL-BREF) physical domain (covering mobility, energy along with daily function) ensuring significant difficulty in routine activities.

Menarche was achieved at the age of 14 years. She was diagnosed with anaemia at the age of 16 years. She had been anaemic for six years with a constantly lower haemoglobin level. She narrated history of heavy and irregular menstrual bleeding lasting for 4-5 days. There was no history of hypertension, diabetes mellitus, thyroid disorder or any other chronic systemic diseases. She was not on any long-term medication currently. The patient did not receive any vitamin D or iron supplementation in past six months. Baseline qualitative dietary intake was assessed using dietary recall, which revealed irregular meals with less intake of nutritious food, while quantitative dietary intake was not assessed. There was inadequate

exposure to sunlight due to prolonged indoor activity. Detailed clinical events timeline is outlined in the [Table/Fig-1]. In present case, a metabolism-centred approach was selected to avoid long term dependence on pharmacological vitamin D supplementation, especially in a young patient. Also, the presence of co-existing anaemia, chronic digestive symptoms, poor appetite, as well as features suggestive of impaired nutrient assimilation, indicated a micronutrient deficiency with possible impaired nutrient assimilation rather than isolated vitamin D deficiency. Hence, an approach targeting underlying pathology, digestive function, as well as overall metabolic and nutritional status was considered more appropriate than direct replacement therapy alone.



[Table/Fig-1]: Clinical timeline of disease progression.

During the initial assessment, it was noted that the patient looked tired and pale. Pallor was evident over her conjunctiva and nail beds. Koilonychia was also observed. Patient's vitals were normal (blood pressure 100/70 mmHg, pulse rate 68/min, Respiratory rate 18/min and temperature: 37°C). Systemic examination was normal. Musculoskeletal system examination revealed bilateral calf muscle

tenderness though there was no swelling, redness or restriction of movement. A summary of clinical and Ayurvedic assessment findings is presented in [Table/Fig-2].

Domain	Parameters	Findings
General examination	Consciousness	Conscious, oriented, cooperative
	Build	Moderately built
	Pallor	Present (Conjunctiva and Nails): Mild (Grade 1)
	Icterus	Absent
	Cyanosis	Absent
	Clubbing	Absent
	Lymphadenopathy	Absent
	Pedal oedema	Absent
	Blood pressure	100/70 mmHg
	Pulse rate	68 beats/min
Astavidha pariksha	Nadi (Pulse)	Vata-Kapha dominant
	Mutra (Urine)	Normal frequency and quantity
	Mala (Stool)	Hard, once daily, unsatisfactory
	Jivha (Tongue)	Sama (Coated)
	Shabda (Speech)	Normal
	Sparsha (Touch)	Normal
	Drika (eyes and vision)	Normal
	Akriti (build)	Sthula
Dashvidha pariksha	Prakriti (body constitution)	Vata-Kapha
	Vikriti (pathological variation)	Vata pradhana tridoshaj vitiation
	Sara (Quality of tissues)	Madhyama
	Samhanana (Compact)	Madhyama
	Pramana (Measurement)	Sthula
	Satmya (adaptability)	Madhyama
	Satva (mental strength)	Madhyama
	Ahara Shakti (Digestion)	Avara (Reduced)
	Vyayama Shakti (exercise capacity)	Avara (Reduced)
	Vaya (Age)	Yuva

[Table/Fig-2]: General examination, Ashtavidha and Dashvidha pariksha.

Clinical assessment through Ayurvedic perspective revealed features indicative of *Agnimandya* which was diagnosed based on presenting features of *kshudhamandya* (loss of appetite), *angamarda* (malaise), *aruchi* (aversion towards food), *sama jivha* (coated tongue) with *Rasa-Rakta Dhatu kshaya* which was assessed clinically based on classical Ayurvedic *lakṣaṇas* which includes *rouksya* (dryness manifested as excessive hair fall), *shrama* (easy fatigability), *glani* (generalised weakness) and functional indicators of *rakta kshaya* such as pallor and long standing anaemia were evident. *Lakṣaṇas* such as *Shabda-asahishnuta* (sound intolerance), *amlapriti*, and *shishir-priti* were not elicited during thorough subjective clinical assessment.

Diagnostic Assessment

Multiple validated tools were used during assessment in order to assess distinct clinical domains relevant to patients presentation. Clinical symptoms were evaluated using VAS, hair pull test and the Sinclair Scale [1]. Functional status and quality of life were assessed through FACIT-Fatigue Scale [2], Simplified Nutritional Appetite Questionnaire (SNAQ) [3] and WHOQOL-BREF [4]. Biochemical assessment included serum 25-hydroxyvitamin D, haemoglobin, serum calcium, vitamin B12 and thyroid-stimulating hormone levels. Serum 25-hydroxyvitamin D {25(OH)D} level was 7.5 ng/mL, confirming severe hypovitaminosis D [5] while haemoglobin level was 10.1 g/dL, suggestive of mild anaemia. Serum calcium (9.3 mg/dL), vitamin B12 (243 pg/mL), thyroid-stimulating hormone (4.031

µIU/mL) levels were also carried out to rule out other metabolic or endocrine causes and all values were within normal reference ranges. Severity of pain was assessed using VAS, which revealed baseline score of 8. Severity of fatigue was assessed using FACIT Fatigue Scale (Version 4), with a baseline score of 28, suggestive of severe fatigue. Appetite and nutritional risk were assessed using SNAQ, which showed baseline score of 10. Pallor was assessed based on clinical examination of conjunctiva as well as nail beds and graded as mild. Hair fall involvement was assessed using the Hair Pull Test to assess active hair shedding while through Sinclair Scale hair density and pattern of hair loss was assessed, which revealed 5-6 hairs per pull with a positive test, suggestive of diffuse hair loss. Quality of life was evaluated using WHOQOL-BREF questionnaire [4]. WHOQOL-BREF scores were expressed on a 0-100% scale with higher scores suggesting good or better quality of life while less indicates reduced. Baseline mean score of 48 indicated reduced quality of life. Domain wise scores were physical health: 31/100, Psychological: 50/100, Social relationships: 50/100 and Environment: 63/100 denoting marked impairment in the physical health domain, moderate impairment in psychological and social domains whereas comparatively better environmental domain scores. Anthropometric assessment revealed a body weight of 66 kg, body mass index of 23.8 kg/m² and waist circumference of 84 cm.

Based on clinical presentation, laboratory findings, assessment scores etc., final diagnosis was concluded as severe hypovitaminosis D associated myalgia and co-existing anaemia. From ayurvedic perspective, diagnosis was considered under *Pandu roga* associated with *Agnimandya* and *Dhatu Kshaya*. Considering, young age of the patient and absence of irreversible pathology, prognosis was considered to be good.

Therapeutic Intervention

Therapeutic interventions given are summarised in [Table/Fig-3] [6-9].

Follow-up and Outcomes

Regular follow-up was done over 51 days to monitor treatment adherence, symptom progression and any adverse events. Marked improvement was noted post treatment in terms of clinical as well as biochemical parameters. Outcomes are summarised in [Table/Fig-4].

DISCUSSION

Hypovitaminosis D is a prevalent micronutrient deficiency with possible impaired nutrient assimilation condition that commonly presents with musculoskeletal symptoms like myalgia, muscle weakness, fatigue and decreased physical performance [10]. Vitamin D is acquired through cutaneous synthesis on exposure to Ultraviolet B (UVB) radiation, dietary sources and supplementation and it is activated through hepatic and renal hydroxylation. Serum 25-hydroxyvitamin D {25(OH)D}, which is end product of metabolism through liver, is considered to be most dependable measure of vitamin D status. Deficiency worsens calcium and phosphate homeostasis, leading to defective bone mineralisation along with neuromuscular dysfunction clinically presenting in the terms of diffuse body pain, calf myalgia and easy fatigability as seen in the present case.

From Ayurveda view, clinical features of pallor, fatigue, anorexia along with musculoskeletal pain parallel with *Pandu roga* [11], which manifest in *Pandu* due to *Agnimandya* and deranged *Rasa* and *Rakta Dhatu* formation. Co-existence of both anaemia (low haemoglobin) and hypovitaminosis D (low vitamin D levels) in this patient implies a general disturbance in her metabolism, rather than a specific nutritional deficiency.

Trayushnadi Loha Vati [6,7], is a classical Ayurvedic formulation indicated in *Pandu roga*. Presence of *Trikatu* i.e., *Shunthi* (*Zingiber officinale*), *Maricha* (*Piper nigrum*), *Pippali* (*Piper longum*) is traditionally described to possess *Deepana* and *pachana*

Type of intervention	Intervention	Details
Pharmacological	<i>Trayushnadi Loha Vati</i> [6,7] each tablet contained <i>Loha Bhasma</i> (Iron <i>Bhasma</i>) 50% as the principal ingredient. The remaining constituents <i>Pippali</i> (<i>Piper longum</i>), <i>Shunthi</i> (<i>Zingiber officinale</i>), <i>Kali Mirch</i> (<i>Piper nigrum</i>), <i>Chavya</i> (<i>Piper chaba</i>), <i>Chitrak root</i> (<i>Plumbago zeylanica</i>), <i>Bakuchi</i> (<i>Psoralea corylifolia</i>), <i>Bhanga</i> (<i>Vijaya</i>), <i>Saindhav Lavan</i> , <i>Vida Lavan</i> , <i>Sauvarchal Lavan</i> , and <i>Audbidh Lavan</i> were present in equal proportions (4.54% each), with excipients q.s. The formulation was manufactured under Good Manufacturing Practices (GMP) by Ananta Hemp Work Pvt. Ltd., New Delhi.	Dose: 500 mg twice daily; Route: Oral; <i>Anupana</i> : Warm water; Duration: Three months
Non-pharmacological	Sun exposure [8]	Daily morning sun exposure for at least 15 minutes with minimal clothing
	Dietary advice [9]	Patient was advised a structured nutritional plan consisting of: Fatty fish (2 servings/week), Egg yolk (3-4 times/week), Animal liver (once weekly), Fortified milk or plant based milk (1-2 servings/day), Fortified cereals (daily), cheese (2-3 times/week), and UV-exposed mushrooms (2-3 times/week) as dietary sources of vitamin D. Iron-rich foods including green leafy vegetables, legumes, dates, jaggery and nuts were advised daily basis and adequate hydration. Junk food, processed foods, irregular meals, and excess caffeine intake were avoided.

[Table/Fig-3]: Therapeutic intervention details [6-9].

Category	Parameters	Before	After
Biochemical parameters	Haemoglobin (g/dL)	10.1	11.3
	Serum 25-hydroxyvitamin D (ng/mL)	7.5	75.9
	Serum calcium (mg/dL)	9.3	9.8
	Vitamin B12 (pg/mL)	243	—
	Thyroid-stimulating hormone (μIU/mL)	4.031	—
Anthropometric parameters	Body weight (kg)	66	64.3
	Body Mass Index (kg/m ²)	23.8	23.55
	Waist circumference (cm)	84	82
Clinical subjective parameters	Myalgia	Present	Reduced
	Generalised weakness	Present	Improved
	Appetite	Reduced	Improved
	Pallor	Mild pallor	Absent
	Hair fall	Present	Reduced
Clinical objective parameters	Visual Analogue Scale (VAS) for myalgia	8	2
	FACIT-Fatigue Scale (Version 4)	28 (Severe fatigue)	35 (Moderate fatigue)
	Simplified Nutritional Appetite Questionnaire (SNAQ)	10 (Poor appetite)	15 (Normal appetite)
	Pallor (Conjunctiva and Nails)	1 (Mild pallor)	0 (No pallor)
	Hair pull test	Positive (5-6 hairs/pull)	Negative (2-3 hairs/pull)

	Sinclair Scale for hair density	Grade 3 (Moderate thinning)	Grade 2 (Mild thinning)
WHO Quality of Life (WHOQOL-BREF) score		48	70

[Table/Fig-4]: Clinical and laboratory outcomes before and after treatment.

properties, which support digestive function along with appetite. In the current case, digestive support was supposed to contribute in the improvement of overall nutritional status as well as symptom relief. From a contemporary science view, correction of underlying digestive and metabolic dysfunction may facilitate improved utilisation of nutrients including vitamin D obtained from dietary sources as well as endogenous synthesis. However, no direct effect on vitamin D metabolism or hepatic hydroxylation is implied as there is no established or proven scientific evidence till now supporting such a mechanism. Reported improvement in vitamin D value is therefore interpreted cautiously as a multifactorial outcome in a single case observation. *Loha Bhasma*, principal component of the formulation is traditionally indicated in conditions of anaemia and is considered supportive in improving haemoglobin parameters as well as overall tissue nourishment. *Vijaya* leaf (*Cannabis sativa*) is included as a minor constituent in *Trayushnadi Loha Vati*, comprising 4.54% of total herbal components (excluding *Loha Bhasma*). In the present formulation its role is supportive for managing pain symptoms and not intended as primary therapeutic agent [6,7].

Sun exposure is a chief physiological source of vitamin D synthesis. UVB radiation converts cutaneous 7-dehydrocholesterol into vitamin D₃; however, lack of outdoor activity, clothing style and indoor lifestyle can hamper endogenous production significantly. Regular morning sun exposure advised in current case likely contributed to vitamin D synthesis alongside improvement in micronutrient absorption [8]. Apart from this, dietary modification played supportive role in management by way of regular intake of vitamin D rich diet along with fortified food and iron and calcium containing food enhancing endogenous vitamin D utilisation and haematological recovery clubbed with micronutrient inefficiency correction [9]. While sun exposure contributes to endogenous vitamin D synthesis through UVB mediated conversion in skin and can be considered a form of physiological vitamin D supplementation. Relatively large surge in serum vitamin D levels over 51 days may be attributed to correction of severe or very low levels during baseline, regular sun exposure, improved dietary intake as well as enhanced absorption following improvement in digestive as well metabolic function, while also acknowledging biological variation in a single case observation. Individual variability in cutaneous synthesis and baseline deficiency may also contribute.

Limitation(s)

This case report has some limitations. This includes iron profile parameters, parathyroid hormone assessment, serum alkaline phosphatase, quantitative dietary vitamin D intake and detailed gynaecological investigations were not carried out because of resource constraints. As this is a single case study, findings cannot be generalised and require further validation through larger controlled studies.

Patient perspective: The patient reported positive improvement in muscle pain, fatigue, along with long-standing weakness, with improved appetite, stamina and overall daily functioning. She expressed satisfaction with the treatment approach as it improved her health without the need for vitamin D injections or supplements.

CONCLUSION(S)

This case report highlighted that an integrative Ayurvedic approach combined with lifestyle modification may lead to significant clinical as well as biochemical improvement in patients with severe

hypovitaminosis D with coexisting anaemia. Regular sun exposure, dietary correction and metabolic-centred approach contributed to normalisation of serum vitamin D levels and improvement in haemoglobin as well as quality of life. Use of *Trayushnadi Loha Vati* was associated with improvement in fatigue and myalgia, among other features, without adverse effects reported. This approach emphasises the importance of addressing nutritional absorption, lifestyle factors and overall metabolic health in managing severe deficiency disorders. Though the present study is a single case observation, larger controlled clinical studies are required in order to validate these findings. This report supports the potential role of integrative management in selected patients with nutritional and micronutrient deficiencies.

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