

# Enhancement in Bone Density in Osteopenia with Polyherbo-mineral Formulations - A Case Report Using Quantitative Ultrasound (QUS)

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Received: 30th May, 2026; Revised: 10th June, 2026; Accepted: 15th June, 2026; Available Online: 18th June, 2026

## ABSTRACT

### Background

Osteopenia represents a precursor stage to osteoporosis and is associated with an increased risk of fragility fractures, especially in postmenopausal women and the elderly. The global burden of Osteopenia and Osteoporosis is steadily increasing with lifestyle factors such as sedentary habits, poor dietary intake of calcium and vitamin D supplementation.

### Case Presentation

A 39-year-old female presented with severe bone pain, hair fall, fatigue, and joint loosening. She was diagnosed with osteopenia, confirmed by Quantitative Ultrasound (QUS) scan showing a T-score of -1.70 and a serum calcium level of 8.6 mg/dL. The patient was managed with polyherbal and mineral formulations that included tablets, a decoction, dietary recommendations and mild exercises for 4 weeks. She was assessed at 15-day intervals.

### Results

Over the course of treatment, she reported improvements in energy, reduced bone pain, decreased hair fall, and relief from fatigue and joint discomfort. At the end of four weeks, her QUS T-score improved to -0.13, while her serum calcium levels increased to 9.0 mg/dL.

### Conclusion

This case suggests that management by polyherbal formulations may have a positive role in improving bone mineral health in osteopenia individuals, although further clinical studies are necessary to substantiate these findings.

**KEYWORDS:** Osteopenia, Polyherbal Formulations, Bone health, QUS, Bone mineral density, Calcium.

**How to cite this article:** Dipankar DG, Jain BB, More K. Enhancement in Bone Density in Osteopenia with Polyherbo-mineral Formulations - A Case Report Using Quantitative Ultrasound (QUS). *Int J Drug Deliv Technol.* 2026;16(61s):933-939. DOI: 10.25258/ijddt.16.61s.102

**Source of support:** Nil.

**Conflict of interest:** None

## INTRODUCTION

In Ancient literature, the strength and stability of the skeletal system are attributed to bone tissue, which plays a vital role in maintaining structural integrity.<sup>[1]</sup> Depletion of bone tissue, is characterized by clinical features such as bone pain, fatigue, hair fall and lax joints which reflects impaired bone health.<sup>[2]</sup> This condition bears clinical similarity to Osteopenia in contemporary medicine, a state defined by reduced Bone Mineral Density (BMD) with a T-score between 1.0 and -2.5, as per WHO criteria.<sup>[3]</sup> Osteopenia represents a precursor stage to osteoporosis and is associated with an increased risk of fragility fractures, especially in postmenopausal women and the elderly. Contributory factors include inadequate calcium intake, hormonal changes, sedentary lifestyle, and chronic illnesses.<sup>[4]</sup> From Classical perspective it can be understood in terms of depletion of bone tissue or impaired tissue nourishment also it highlights the role of diet, lifestyle and rejuvenating therapies in maintaining bone health and preventing degenerative changes. Ayurveda offers a comprehensive approach to bone health through bone nourishment, employing polyherbo-mineral formulations, medicated ghee preparations, and lifestyle modifications aimed at restoring tissue balance.<sup>[5]</sup>

This study evaluates the clinical efficacy of a polyherbo-mineral formulation, administered with medicated ghee on an empty stomach, in improving subjective symptoms and objective parameters of osteopenia over a 30-day period.

## AIMS AND OBJECTIVE

To determine the effect of polyherbo-mineral formulations in the management of depletion of bone tissue by a single case study.

## MATERIALS AND METHODS

### Case Presentation

**Patient Information** – A 52 years non-hypertensive, non-diabetic female patient came to OPD at Dr. D. Y. Patil Ayurved Hospital and Research Centre, Pimpri Pune with chief complains of pain in bones, generalized fatigue, occasional back stiffness and hair fall since last 2-3 months. Patient had no prior history of trauma or fracture but reported with mild vitamin D deficiency. Patient does the tailoring work since last 20-25 years which ensures sitting for long hours.

**Family History** - There was no family history of any co-morbidities.

**Past History** - No history of DM/HTN/ Thyroid disease.

**Ashtavidh Pariksha-**

Pulse - 80/min  
Urine - Normal  
Stool - Irregular bowel  
Tongue - Coated  
Speech - Clear  
Temperature - Normal  
Eyes - Normal (uses spectacle while working)  
Built - Moderate

**General Examination -**

Bowel - Irregular Bowel Habits and Unsatisfactory  
Bladder frequency - Five to six times a day with no nycturia  
Sleep - Disturbed  
Diet - Mixed  
Occupation - Stay-at-home (Tailoring work)  
Habit - Tea twice a day

**Causative Factors Observed** – Staying awake at night, suppressing natural urges, stress, eating incompatible and stale food.

**Clinical Findings**

Pulse rate – 80/min,  
BP – 110/70 mm Hg,  
RR – 20/min,  
Temperature – Afebrile

**Physical Exam** - No joint swelling or tenderness; normal gait; no reduced lower limb strength.

**Diagnostic Assessment** - The patient was diagnosed with osteopenia based on a comprehensive evaluation of both subjective and objective parameters. Clinically, the patient presented with symptoms such as pain in bones, generalized fatigue, joint loosening, and hair fall. Features consistent with bone tissue depletion as described in classical texts.

Objective assessment included a Quantitative Ultrasound (QUS) scan of the calcaneus, which revealed a T-score of -1.70, confirming osteopenia according to WHO criteria. Additionally, serum calcium levels were found in low-normal range, supporting the diagnosis of compromised bone mineral metabolism. This integrative assessment established a clear osteopenia profile, forming the basis for initiating intervention of polyherbo-mineral formulations.

Medications advised as a treatment are mentioned in Table No. 1.

**Dietary Advice** - Increase calcium-rich foods (sesame seeds, ragi, leafy greens)

**Lifestyle Advice** - Mild sun exposure; 20 min brisk walking/day

No modern medications were used during the treatment period. No adverse effects reported.

**Follow-up and Outcomes** - The patient was monitored over a period of 30 days, with a follow-up assessment conducted at 15-day intervals. At the 15-day follow-up, notable improvements were observed in subjective symptoms,

including a reduction in pain in bones, generalized fatigue, joint loosening, and hair fall assessed by gradation system. The patient's overall functional capacity and physical activity levels improved, indicating early clinical response.

Objective assessments also showed positive trends, with a significant improvement in the QUS T-score (from -1.70 to -0.13) (from osteopenia to normal range) and a mild increase in serum calcium levels toward the mid-normal range (from 8.6 to 9.0). By the end of the 30-day intervention, improvements were documented in both subjective wellbeing and bone health indicators, suggesting that the polyherbo-mineral formulations administered with medicated ghee, contributed to enhance calcium metabolism and early reversal of osteopenic changes. Patient-reported improved stamina, reduced joint stiffness, and better sleep. No adverse effects were reported during the intervention period.

Subjectively, the patient was assessed on the parameters - pain in bones, generalized fatigue, joint loosening, and hair fall-symptoms consistent with bone tissue depletion as described in contemporary texts. Assessment and results are mentioned in Table No. 2 and Chart 1.

**Objective assessment was performed using -**

Quantitative Ultrasound (QUS) of the calcaneus- T-score indicating osteopenia as per WHO classification (Table No 3). Serum Calcium levels- As per lab standards. Results graphically present in Chart 2.

**DISCUSSION**

The present case study highlights the clinical efficacy of polyherbo-mineral interventions in a patient diagnosed with osteopenia. The therapeutic protocol included polyherbo-mineral formulation comprising Ashwagandha (*Withania somnifera*), Shallaki (*Boswellia serrata*), Asthisamhara (*Cissus quadrangularis*), Vijaya churna (*Cannabis sativa*), and Kukkutanda twak bhasma (calcined eggshell). Each component of the formulation has classical and modern evidence supporting its role in bone health-

*Withania somnifera* is known for its rejuvenating properties and is reputed for its adaptogenic and anabolic effects, which may enhance osteoblastic activity and reduce cortisol-induced bone resorption.<sup>[6]</sup>

*Boswellia serrata* possesses anti-inflammatory properties by inhibiting 5-lipoxygenase pathways, which may be beneficial in reducing subclinical inflammation contributing to bone loss.<sup>[7]</sup>

*Cissus quadrangularis* has a well-documented role in promoting fracture healing and improving bone density, possibly by enhancing osteoblast proliferation and mineralization.<sup>[8]</sup>

*Cannabis sativa*, although used cautiously due to its psychoactive nature, is mentioned in ayurvedic texts as an analgesic and strengthening agent.<sup>[9]</sup> Recent pharmacological investigations suggest its potential role in modulating endocannabinoid pathways that influence bone metabolism.

Kukkutanda twak bhasma is rich in bioavailable calcium and other trace minerals, contributing directly to the bone matrix and mineralization process. <sup>[10]</sup>

The use of Panchatikta Ghrita (medicated ghee) was mainly thought as synergist which is significant, given its deep tissue penetration, anti-inflammatory action, and affinity for bone

tissue.<sup>[11]</sup> According to pharmacological principles, bitter taste and medicated ghee base help pacify vitiated Vata dosha and aid in nourishing the bone tissue.

The use of QUS, though less sensitive than DEXA, provides a feasible, non-invasive screening tool in low-resource settings. Serum calcium is a useful adjunct marker, though not solely predictive of BMD changes. The limitation of this report is the single-patient sample and the absence of a control or placebo group. However, the objective improvements observed in both scan and lab data justify further exploration through controlled clinical trials.

### CONCLUSION

This case study elaborates potential efficacy of polyherbo-mineral formulations in improving bone health in osteopenic patients. The prescribed polyherbal and mineral formulation combined with medicated ghee and lifestyle modifications showed significant improvements in symptoms such as bone pain, fatigue, hair fall, and joint laxity. Objective improvements were also evident with a marked increase in QUS T-score from -1.70 to -0.13 and normalized serum calcium levels. These findings suggest that polyherbo-mineral interventions may enhance bone mineral density, calcium metabolism, and overall skeletal integrity. Although QUS serves as a practical screening tool in resource-limited settings, further studies using gold-standard assessments like DEXA are warranted. Limitations include the single-case design and absence of a control group. But, the reported clinical benefits and safety profile support larger, controlled clinical trials to validate and standardize polyherbal therapies for osteopenia and related bone disorders. Patient Perspective "After the treatment, I felt stronger and less tired. My follow-up report showed better bone strength, which made me more confident in continuing the medicine."

### INFORMED CONSENT

Disease condition and line of treatment was completely explained to patient. The risks and benefits were also informed. Written informed consent was obtained from the patient for treatment and publication of this case report and any accompanying data.

### ACKNOWLEDGMENTS

I am thankful to my guide and research team for guidance and encouragement for this work.

### CONFLICTS OF INTEREST

There are no any conflict of interests.

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### GRAPHICAL ABSTRACT

# Enhancement in Bone Density in Osteopenia with Polyherbo-mineral Formulations - A Case Report Using Quantitative Ultrasound (QUS)

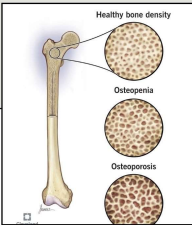
## Enhancement in Bone Density in Osteopenia with Polyherbal Formulations - A Case Report Using Quantitative Ultrasound (QUS) and Serum Calcium

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**Vd. Bhumika B Jain**  
PG Scholar, Department of Kayachikitsa, Dr. D. Y. Patil College of Ayurved, Hospital and Research Centre, Pimpri, Pune - 411018

**Background**

Osteopenia is a precursor to Osteoporosis that carries bone degeneration and significant risk of fractures. The long-term safety and accessibility of pharmacological treatment is limited. Hence alternative approach such as traditional Ayurvedic interventions may help improve the bone health.



**Material and Methodology**

**Case description:** A 39 year old female presented with the complaints of severe bone pain, hairfall and, fatigue .

- Getting confirmed by QUS scan (T-score: -1.7) and Serum Calcium- 8.6 mg/dL, she was diagnosed with Osteopenia.

**Management:** She was managed with the Polyherbal medicine regimen consisting of tablets and decoctions administered orally for the duration of 4 weeks

- Dietary recommendations and mild exercises were also advised.
- Assessment was done at an interval of 15 days.

**Result:** The patient reported subjective improvement in energy levels, pain in bones, hairfall, fatigue and joint loosening.

- At the end of 4 weeks , the patient's QUS T-score improved to -0.13 and Serum Calcium to 9.0 mg/dL.

**Conclusion:** The case suggests that Polyherbal management may improve bone mineral status in Osteopenic individuals. Further clinical studies are warranted to validate these findings.



### TABLES AND GRAPHS SHOWING RESULTS ARE ATTACHED BELOW

Table no. 1  
**Medication advised for 1 month**

Sr. No	Medication	Dose	Time of administration
1.	<i>Withania somnifera</i> powder <i>Boswellia serrata</i> powder <i>Cissus quadrangularis</i> powder --each 5 gm , <i>Cannabis sativa</i> seed powder Calcined eggshell -- each 50mg	Kashaya - (50ml) 2 tsp	Twice a day on empty stomach with lukewarm water
2.	Panchtikta Ghruta	2 table spoon	Twice a day on empty stomach with lukewarm water
3.	Praval panchamrut	250 gm	Twice a day on empty stomach with lukewarm water

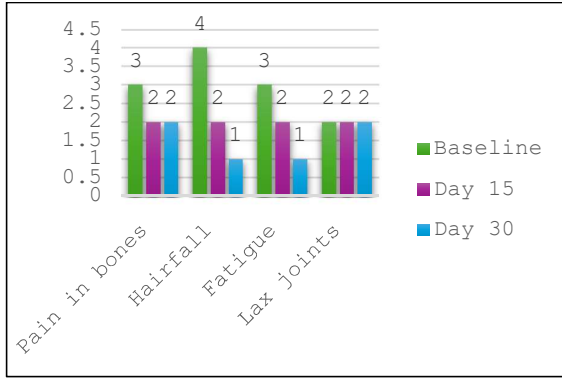
4.	Sarak Vati	500 mg	Once a day after dinner with lukewarm water
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### Subjective assessment criteria (gradation as per severity) Table no. 2<sup>[5]</sup>

Sr. No	Sign and Symptoms	Criteria	Grade
1.	<b>Pain in Bones</b>	No piercing pain in bones	0
		Mild piercing pain in bones which doesn't affect daily activities	1
		Moderate piercing pain in bones not affecting daily activities	2
		Frequent severe piercing pain in bones which affects daily activities	3
		Continuous severe piercing pain in bones with restricted movements	4
2.	<b>Hair fall</b>	No hair fall	0
		Hair fall once in the morning while washing/ combing	1
		Hair fall on every time of combing	2
		Hair fall even without combing and raised hairline in frontal region	3
		Visible or significant baldness in frontal region	4
3.	<b>Fatigue</b>	No tiredness	0
		Tiredness with excess exertion.	1
		Tiredness with moderate level of exertion.	2
		Tiredness with mild level of exertion.	3
		Tiredness at resting	4
4.	<b>Lax Joints</b>	No feeling of joint loosening	0
		Mild loosening of joints when movements are done without any difficulty	1
		Moderate feeling of joint loosening. (can stand/walk with difficulty)	2
		Severe joint loosening(can stand/walk with support)	3
		Very severe joint loosening. (cannot stand/walk)	4

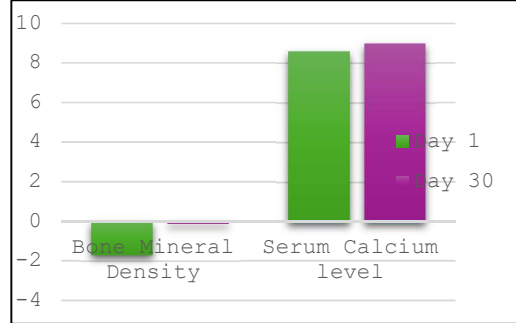
### Subjective assessment of patient on 5 grade scale Chart 1

Enhancement in Bone Density in Osteopenia with Polyherbo-mineral Formulations - A Case Report Using Quantitative Ultrasound (QUS)



Between 1.0 to -1.0	Normal BMD
Between -1.0 to -2.5	Osteopenia
-2.5 or lesser	Osteoporosis

Objective assessment of the patient  
Chart 2



QUS as per WHO classification<sup>[6]</sup>

Table no. 3

QUS of calcaneus (t-score)	Classification
1.0 or greater	High BMD

IMAGES SHOWING BEFORE TREATMENT AND AFTER TREATMENT RESULTS

**Report (Result)**

Hospital Address : Dr. D. Y. PATIL AYURVED HOSPITAL AND RESEARCH CENTRE Printed Date : 2025.07.07

Patch

Patient Information

Patient ID : 8406 Name : Sangeeta Sutar  
 Birth Date : 1985/02/26 Gender : Female  
 Ethnicity : Asian Height : 0.0 cm  
 Weight : 0.0 kg Register Date : 2025.07.07  
 Foot Supporter : 1 Accession Number :

Graph

Right Foot  
T-Score : -1.70

Normal Osteopenia Osteoporosis

Result

Scan Date : 2025.07.07 Scan Time : 15.39  
 Site : Right Foot BQI : 72.3  
 T-Score : -1.70 T-Ratio : 69.5%  
 Z-Score : -1.7 Z-Ratio : 75.1%  
 SOS[n/s] : 1501.6 BUA[dB/MHz] : 88.2

Comment

Doctor Name :

WHO T-Score classification :  
 T-Score >= -1.0 Normal  
 -1.0 > T-Score > -2.5 Osteopenia  
 -2.5 >= T-Score Osteoporosis

**SONOST 3000**

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www.osteosys.com

**DPU** Dr. D.Y. Patil Ayurved Hospital & Research Centre  
 Sant Tukaram Nagar, Pimpri, Pune - 020-27122125

Central Clinical Laboratory

Patient Name : Sangeeta Kallappa Sutar Requisition No : 5621  
 OPD/IPD No : Q250000406 Ward : KATACHIKITSA  
 Age : 39 Referred By : Vd. Abhishek Chaturagun Laga  
 Gender : Female Date : 07/07/2025

SubTest	Result	Normal Range
Sr. calcium		
1 Calcium	8.6	8.2 - 10.4

Remarks:

Prepared By

for 8/7/25  
 Pathologist 4430 PM

Page 1 of 1

BMD Report Before Treatment

Serum Calcium Report Before Treatment

Enhancement in Bone Density in Osteopenia with Polyherbo-mineral Formulations - A Case Report Using Quantitative Ultrasound (QUS)

**Report (Result)**

Patch

Hospital Address : Dr.D.Y.PATIL AYURVED HOSPITAL AND RESEARCH CENTRE Printed Date : 2025.08.04

---

**Patient information**

PatientID.....	8406	Name.....	Sangeeta Sutar
BirthDate.....	1985/02/26	Gender.....	Female
Ethnicity.....	Asian	Height.....	0.0 cm
Weight.....	0.0 kg	Regist Date.....	2025.07.07
Foot Supporter.....	1	Accession Number.....	

---

**Graph**

Right Foot

T-Score : -0.13

---

**Result**

ScanDate.....	2025.08.04	Scan Time.....	15:26
Site.....	Right Foot	BOI.....	101.6
T-Score.....	-0.13	T-Ratio.....	97.7%
Z-Score.....	0.4	Z-Ratio.....	105.5%
SOS[m/s].....	1531.5	BUA[dB/MHz].....	107.1

---

**Comment**

Doctor Name :

---

WHO T-Score classification :  
 T-Score >= -1.0 Normal  
 -1.0 > T-Score > -2.5 Osteopenia  
 -2.5 >= T-Score Osteoporosis

**SONOST 3000**

**OsteoSys**  
www.osteosys.com

BMD Report After Treatment

**DPU** Dr. D.Y. Patil Ayurved Hospital & Research Centre  
 Sant Tukaram Nagar, Prapuri, Pune - 412 01212125

**Central Clinical Laboratory**

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Patient Name : Sangeeta Kallappa Sutar Requisition No : 6311  
 OPD/IPD No : Q2500008406 Ward : KAYACHIKITSA  
 Age : 39 Referred By : Vd. Abhilasha Chatragun Laga  
 Gender : Female Date : 04/08/2025

---

SubTest	Result	NormalRange
Sr. calcium		
1 Calcium	9.0	8.2 - 10.4

---

**Advice:**

**Remarks:** Kindly Correlate Clinically.

---

Prepared By: *[Signature]*  
 Pathologist: *[Signature]*

Page 1 of 1  
**Dr. SNEHAL S. SHAMARE**  
 MBBS, DNB (Pathology)  
 Reg No. 2020127060

Serum Calcium Report After Treatment

INFORMED CONSENT

BMD Report After Treatment

Serum Calcium Report After Treatment

Enhancement in Bone Density in Osteopenia with Polyherbo-mineral Formulations - A Case Report Using Quantitative Ultrasound (QUS)

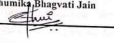
**Statement by the researcher/person taking consent**

I have accurately read out the information sheet to the potential participant, and to the best of my ability made sure that the participant understands that the following will be done:

1. Regular medicine must be taken.
2. Decided treatment, dosage and regular follow up must be done.

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

A copy of this ICF has been provided to the participant.


Name of Researcher/person taking the consent: Dr. Bhumiya Bhagvati Jain  
Signature of Researcher /person taking the consent:   
Date: 17/07/25

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Researcher Declaration

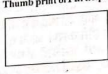
**PART-2 CERTIFICATE OF CONSENT**

I have read the foregoing information, or it has been read to me. I have the opportunity to ask questions about it and any questions that I have asked have been answered to my satisfaction. I consent voluntarily to participate as a participant in this research.

Name of Participant: સંગિતા મહાલા સુતાર  
Signature of Participant:   
Date: 17/07/25

I have witnessed the accurate reading of the consent form to the potential participant, and the individual has had the opportunity to ask questions. I confirm that the individual has given consent freely.

Name of witness: \_\_\_\_\_  
Signature of witness: \_\_\_\_\_  
Date: \_\_\_\_\_

Thumb print of Participant: 

35

Patient Consent