

ANATOMICAL CHANGES IN BONES DUE TO THE EFFECT OF INTAKE OF CHANDRASOOR (*Lepidium sativum* L.)

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Abstract

Chandrasoor, commonly known as garden cress and botanically identified as *Lepidium sativum* L., is an edible medicinal plant belonging to the family Brassicaceae. Its seeds have traditionally been consumed in India and have been associated with bone health and fracture healing.¹ The seeds contain several nutritionally important constituents, including calcium, phosphorus, iron, proteins, fatty acids, vitamins and various phytochemicals such as flavonoids, alkaloids, phenolic compounds and glucosinolates.² Experimental studies, particularly in animal models, have demonstrated that *Lepidium sativum* supplementation may promote callus formation, mineral deposition and regeneration of bone following fracture.³⁻⁴ However, direct evidence demonstrating anatomical changes in normal human bones following routine dietary intake is limited. The available evidence therefore mainly supports a potential osteoprotective and bone-healing effect rather than establishing a definitive anatomical change in healthy human bone.

Keywords: Bone, *Chandrasoor*, *Lepidium sativum*, Calcium and Phosphorus

Introduction

Bone is a highly specialized connective tissue that provides structural support, protects internal organs, facilitates movement and serves as an important reservoir for minerals, particularly calcium and phosphorus. Normal bone is continuously remodeled through the coordinated

activities of osteoblasts, osteoclasts and osteocytes. Adequate availability of minerals and nutrients is essential for maintaining bone matrix and mineralization.

Chandrasoor (*Lepidium sativum* L.) is an annual herb commonly known in India as Chandrasura or Chandrasoor.¹ The seeds are traditionally used as a food and medicinal preparation. Reviews of *Lepidium sativum* have reported appreciable nutritional content, including calcium and phosphorus, together with proteins, fatty acids, iron and several bioactive phytochemicals.^{2,5} These properties have led to interest in its possible role in maintaining bone health and supporting fracture repair.

Nutritional and Phytochemical Basis for Bone Effects

The seeds of *Lepidium sativum* contain minerals such as calcium, phosphorus, potassium and iron.² Calcium is an essential component of hydroxyapatite crystals, which provide hardness and mechanical strength to bone. Phosphorus combines with calcium during mineralization and is therefore also essential for skeletal development and maintenance.

Apart from minerals, *Lepidium sativum* contains flavonoids, phenolic compounds, alkaloids, phytosterols, glucosinolates and other bioactive constituents.^{2,5} These compounds have been investigated for antioxidant and anti-inflammatory activities, which may be relevant to the biological environment surrounding bone remodeling and repair. Recent reviews also describe osteoprotective and bone-healing activities among the reported preclinical effects of *Lepidium sativum*.⁵⁻⁶

Anatomical and Histological Changes

The most direct evidence concerning anatomical changes comes from experimental fracture models. In a study conducted in male albino rats, administration of *Lepidium sativum* seed preparations was associated with improved radiographic evidence of fracture healing. Treated groups demonstrated more prominent callus formation and progressive reduction of the fracture line compared with the healing process observed without treatment.⁴ Histopathological examination also supported new bone formation and progression of healing.

Callus formation represents an important anatomical stage of fracture repair. Initially, a soft callus develops around the fracture, followed by formation of a harder mineralized callus. With continued remodeling, the newly formed bone gradually becomes organized and mechanically

stronger. The experimental findings with *Lepidium sativum* therefore suggest that its intake may accelerate some of these processes in a healing bone.^{3,4}

Possible Effects on Bone Remodeling

Bone remodeling consists of two major cellular processes: bone resorption by osteoclasts and bone formation by osteoblasts. Nutritional availability of calcium and phosphorus is fundamental to mineralization of the osteoid matrix. The mineral-rich nature of *Lepidium sativum* seeds provides a plausible nutritional basis for supporting this process.²

Experimental observations have also suggested that phytochemicals such as flavonoids and other phenolic constituents may contribute to the observed bone-healing effects.³ These compounds may influence oxidative stress and inflammatory pathways, although the precise molecular mechanisms through which *Lepidium sativum* affects bone cells remain incompletely established.

It is important to distinguish bone healing after injury from anatomical enlargement or structural alteration of healthy bones. Current evidence does not establish that ordinary consumption of Chandrasoor causes measurable enlargement, thickening or deformity of normal human bones. Rather, the available preclinical evidence indicates a possible enhancement of repair and regeneration in damaged bone.

Effect on Callus Formation and New Bone Formation

Callus formation is one of the most visible anatomical indicators of fracture repair. In experimental studies, *Lepidium sativum* seed administration produced clearer callus development and progressive healing of the fracture site.^{3,4} In one study, radiographs after several weeks showed substantial improvement in the treated groups, with the fracture line becoming less distinct and healing approaching completion in some animals.⁴

These findings suggest that Chandrasoor may influence the reparative phase of bone healing by supporting mineral availability and osteoblastic activity. Nevertheless, these observations are derived primarily from animal studies, and the magnitude of any comparable effect in humans has not been adequately established.

Role of Calcium and Phosphorus

Calcium and phosphorus are the principal inorganic components of bone mineral. *Lepidium sativum* seeds are reported to contain both minerals and are consequently considered

nutritionally valuable.^{2,5} In the experimental fracture study, supplementation with *Lepidium sativum* extracts was associated with significant changes in serum calcium and phosphorus during later stages of fracture healing.³

The investigators proposed that the mineral content of the seeds contributed to these biochemical changes and to improved bone healing.³ However, serum mineral levels alone cannot establish a direct anatomical change in bone. Demonstrating changes in bone mineral density, cortical thickness, trabecular architecture or other skeletal parameters in humans would require appropriately designed clinical and imaging studies.

Possible Osteoprotective Mechanisms

The potential effect of Chandrasoor on bone can be summarized through several possible mechanisms:

1. Mineral supply: Calcium and phosphorus may provide substrates required for bone mineralization.²
2. Osteoblastic activity: Experimental studies have reported increased alkaline phosphatase activity during particular stages of fracture healing, suggesting enhanced osteoblastic activity.³
3. Callus formation: Animal studies have demonstrated increased or earlier callus formation following administration of *Lepidium sativum* preparations.^{3,4}
4. Antioxidant activity: Phytochemicals present in the seeds possess antioxidant properties that may contribute indirectly to a favorable environment for tissue repair.⁵
5. Anti-inflammatory potential: Reported anti-inflammatory properties may potentially influence the inflammatory phase of tissue repair, although the specific contribution to human bone healing requires further investigation.⁵⁻⁶

Limitations of Current Evidence

Although experimental findings are encouraging, several limitations should be considered. Much of the evidence concerning anatomical bone changes comes from animal models rather than human clinical trials.^{3,4} Differences in dosage, extraction method, duration of administration and experimental model also make direct comparison between studies difficult.

Furthermore, nutritional composition can vary according to plant variety, cultivation conditions and other factors.² Therefore, findings obtained with concentrated extracts or experimentally administered seed preparations should not automatically be extrapolated to ordinary dietary consumption.

Conclusion

Chandrasoor (*Lepidium sativum* L.) is a nutritionally rich medicinal plant containing calcium, phosphorus, proteins and several biologically active phytochemicals.² Available experimental evidence indicates that intake of *Lepidium sativum* seeds may promote callus formation, mineralization and new bone formation during fracture healing.^{3,4} Histological and radiographic observations in animal models provide preliminary evidence of improved anatomical repair of fractured bone.

However, there is currently insufficient evidence to conclude that routine Chandrasoor consumption produces specific anatomical alterations in normal human bones. The strongest available evidence supports its potential role in bone healing and maintenance, rather than a proven structural transformation of healthy human bone. Further well-controlled human studies using radiographic and bone-mineral-density measurements are required to establish its effects on human skeletal anatomy.

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