How vitamin d affects parathyroid function and bone health.

Namal Nealy*

Department of Biochemistry, University of Queensland, Australia

Introduction

Vitamin D is a crucial nutrient that plays a fundamental role in maintaining overall health, particularly in regulating parathyroid function and supporting bone health. Its effects are deeply intertwined with calcium metabolism, a process essential for numerous bodily functions. Understanding how vitamin D influences parathyroid function and bone health provides valuable insights into maintaining optimal well-being and preventing various health issues. Vitamin D's primary role in the body is to enhance the absorption of calcium and phosphate from the digestive tract. This function is critical because calcium and phosphate are essential minerals that support bone formation and maintenance. Without adequate levels of vitamin D, the body struggles to absorb these minerals efficiently, leading to imbalances that can affect bone health and overall metabolic function [1, 2].

The relationship between vitamin D and parathyroid function is particularly important. The parathyroid glands, small endocrine organs located behind the thyroid gland in the neck, regulate calcium levels in the bloodstream through the secretion of Parathyroid Hormone (PTH). When blood calcium levels drop, the parathyroid glands release PTH, which acts to increase calcium levels through several mechanisms, including the release of calcium from bones, increased renal reabsorption of calcium, and enhanced intestinal absorption of calcium. Vitamin D plays a critical role in the latter mechanism—enhancing intestinal calcium absorption. When vitamin D levels are insufficient, the efficiency of calcium absorption from the gut decreases, leading to lower serum calcium levels. In response to these lower calcium levels, the parathyroid glands increase PTH production to restore calcium balance. This compensatory mechanism involves mobilizing calcium from the bones and increasing renal calcium reabsorption. However, chronic low levels of vitamin D can lead to persistently high levels of PTH, a condition known as secondary hyperparathyroidism [3, 4].

Secondary hyperparathyroidism is characterized by elevated PTH levels due to a chronic deficiency of calcium or vitamin D. Over time, the increased PTH secretion can lead to excessive bone resorption as the body attempts to maintain normal calcium levels. This process can result in weakened bones, increased risk of fractures, and conditions such as osteopenia or osteoporosis. The relationship between vitamin D deficiency, secondary hyperparathyroidism, and bone health underscores the importance of maintaining adequate vitamin D levels to support normal parathyroid function and bone integrity [5, 6].

Vitamin D also directly influences bone health through its effects on bone remodeling. Bone remodeling is the continuous process of bone resorption and formation carried out by osteoclasts and osteoblasts, respectively. Adequate vitamin D levels support this process by ensuring that sufficient calcium is available for new bone formation. Inadequate vitamin D levels can impair bone mineralization, leading to conditions such as osteomalacia in adults and rickets in children. Osteomalacia is characterized by the softening of bones due to defective mineralization, while rickets involves the abnormal development of bones in growing children. The impact of vitamin D on bone health extends to the prevention and management of osteoporosis, a condition marked by reduced bone density and increased fracture risk. Osteoporosis is often associated with aging, but vitamin D deficiency can exacerbate the condition by impairing calcium absorption and contributing to secondary hyperparathyroidism [7, 8].

Adequate vitamin D intake, combined with sufficient calcium, is crucial for maintaining bone density and reducing the risk of fractures. This is particularly important for postmenopausal women and older adults, who are at higher risk for osteoporosis. Addressing vitamin D deficiency involves ensuring adequate intake through diet, supplementation, and exposure to sunlight. Vitamin D can be obtained from dietary sources such as fatty fish, fortified dairy products, and eggs, as well as from supplements. Sunlight exposure also plays a role in vitamin D synthesis in the skin, although factors such as geographic location, skin pigmentation, and sunscreen use can affect the amount of vitamin D produced. For individuals with low vitamin D levels or those at risk of deficiency, supplementation is often recommended to achieve optimal levels and support overall health [9, 10].

Conclusion

In summary, vitamin D is integral to regulating parathyroid function and maintaining bone health. Its role in enhancing calcium absorption directly affects parathyroid hormone secretion and bone remodeling. Adequate vitamin D levels help prevent secondary hyperparathyroidism, support bone mineralization, and reduce the risk of osteoporosis and fractures. Addressing vitamin D deficiency through diet, supplementation, and sunlight exposure is crucial for maintaining optimal health and preventing complications

***Correspondence to:** Namal Nealy, Department of Biochemistry, University of Queensland, Australia. E-mail: namnea@uq.au

***Received:** 29-Jul-2024, Manuscript No. AAAGIM-24-145864; **Editor assigned:** 01-Aug-2024, PreQC No. AAAGIM-24-145864 (PQ); **Reviewed:** 14-Aug-2024, QC No. AAAGIM-24-145864; **Revised:** 19-Aug-2024, Manuscript No. AAAGIM-24-145864 (R); **Published:** 26-Aug-2024, DOI: 10.35841/aaagim-8.4.247*

***Citation:** Nealy N. How vitamin d affects parathyroid function and bone health. Arch Gen Intern Med. 2024;8(4):247.*

associated with impaired parathyroid function and weakened bones.

References

1. Guilmette J, Sadow PM. Parathyroid pathology. Surg Pathol Clin. 2019;12(4):1007-19.
2. Petranović Ovčariček P, Giovanella L, Carrió Gasset I, et al. The EANM practice guidelines for parathyroid imaging. Eur J Nucl Med Mol Imaging. 2021;48:2801-22.
3. Verdelli C, Vaira V, Corbetta S. Parathyroid tumor microenvironment. Adv Exp Med Biol. 2020:37-50.
4. Jamshidi R, Egan JC. Pediatric parathyroid disease. Semin Pediatr Surg. 2020;29(3): 150923.
5. Graves CE, Duh QY, Suh I. Innovations in Parathyroid Localization Imaging. Surg Oncol Clin N Am. 2022;31(4):631-47.
6. Chen T, Wang Y, Hao Z, et al. Parathyroid hormone and its related peptides in bone metabolism. Biochem Pharmacol. 2021;192:114669.
7. Goltzman D, Mannstadt M, Marcocci C. Physiology of the calcium-parathyroid hormone-vitamin D axis. Front Horm Res. 2018;50:1-3.
8. Kuzma M, Jackuliak P, Killinger Z, et al. Parathyroid hormone-related changes of bone structure. Physiol Res. 2021;70(1):S3.
9. Lorente-Poch L, de Miguel-Palacio M, Sancho-Insenser J. Correlation between visual scores and parathyroid function. Front Endocrinol. 2023;14:1217795.
10. Gordon RJ, Levine MA. Genetic disorders of parathyroid development and function. Endocrinol Metab Clin North Am. 2018;47(4):809-23.

Citation: *Nealy N. How vitamin d affects parathyroid function and bone health. Arch Gen Intern Med. 2024;8(4):247.*