OPEN ACCESS Freely available online

Journal of Osteoporosis and Physical Activity

Opinion Article

Monitoring Bone Health in Diabetic Patients

Linde Maurcoi*

Department of Endocrinology and Internal Medicine, Aarhus University, Aarhus, Denmark

DESCRIPTION

Diabetes mellitus, a chronic metabolic disorder characterized by high blood glucose levels, has far-reaching effects on various bodily systems, including the skeletal system. Research indicates that individuals with diabetes are at an increased risk for bone-related complications, such as osteoporosis and fractures. Understanding the biochemical bone turnover markers in diabetes mellitus is essential for diagnosing and managing these bone health issues effectively. Bone is a dynamic tissue that undergoes continuous remodelling through two primary processes: Bone formation and bone resorption. Bone turnover markers are biochemical indicators found in blood or urine that reflect the rates of these processes.

These markers are categorized into two groups, one is markers of bone formation include, osteocalcin a protein produced by osteoblasts (bone-forming cells) and involved in bone mineralization. Procollagen Type I N-terminal Propeptide (P1NP) a precursor of type I collagen, which is essential for bone strength. Bone-specific Alkaline Phosphatase (BSAP) an enzyme associated with osteoblast activity. Another one was markers of bone resorption, these include, C-terminal Telopeptide of Type I Collagen (CTX) a fragment of collagen released during bone resorption. N-terminal Telopeptide of Type I Collagen (NTX) another collagen fragment indicative of bone degradation. Tartrate-resistant Acid Phosphatase 5b (TRAP 5b) an enzyme released by osteoclasts (bone-resorbing cells).

Impact of diabetes mellitus on bone health

Diabetes mellitus affects bone health through various mechanisms. Chronic hyperglycemia (high blood sugar) and insulin resistance, hallmarks of diabetes, can impair bone remodelling, leading to altered bone density and quality. The effects of diabetes on bone turnover markers provide insights into these underlying mechanisms. Bone turnover makers in type 1 diabetes is characterized by an absolute deficiency of insulin due to autoimmune destruction of pancreatic beta cells. Studies have shown that individuals with type 1 diabetes often exhibit lower levels of bone formation markers, such as osteocalcin and P1NP. This reduction is associated with decreased osteoblast function and impaired bone formation.

Additionally, bone resorption markers, such as CTX and NTX, may be elevated or unchanged in type 1 diabetes. The imbalance between bone formation and resorption can lead to decreased Bone Mineral Density (BMD) and an increased risk of fractures. Bone turnover maker in type 2 diabetes is characterized by insulin resistance and relative insulin deficiency. The impact of type 2 diabetes on bone turnover markers is more complex. Some studies suggest that bone formation markers, such as osteocalcin, are lower in individuals with type 2 diabetes, indicating reduced bone formation activity. However, other studies have reported normal or even increased levels of bone formation markers, potentially due to the compensatory effects of higher body weight, which is common in type 2 diabetes and can stimulate bone formation. Bone resorption markers in type 2 diabetes are generally found to be lower or within the normal range, suggesting reduced bone turnover overall. This reduced bone turnover can lead to poor bone quality and an increased risk of fractures despite normal or higher BMD.

The role of Advanced Glycation End Products (AGEs)

One of the key factors linking diabetes and bone health is the accumulation of Advanced Glycation End Products (AGEs). AGEs are formed when proteins or lipids become glycated as a result of chronic hyperglycemia. These compounds can accumulate in bone tissue, altering the bone matrix and impairing its mechanical properties. AGEs can also affect bone turnover markers by inhibiting osteoblast function and promoting osteoclast activity, leading to imbalances in bone remodelling.

Clinical implications and management

Monitoring biochemical bone turnover markers in individuals with diabetes mellitus can provide valuable information for assessing bone health and fracture risk. Early detection of abnormalities in these markers can prompt interventions to

Correspondence to: Linde Maurcoi, Department of Endocrinology and Internal Medicine, Aarhus University, Aarhus, Denmark, E-mail: linmac@yahoo.com

Received: 01-Jul-2024, Manuscript No. JOPA-24-33339; **Editor assigned:** 03-Jul-2024, PreQC No. JOPA-24-33339 (PQ); **Reviewed:** 17-Jul-2024, QC No. JOPA-24-33339; **Revised:** 24-Jul-2024, Manuscript No. JOPA-24-33339 (R); **Published:** 01-Aug-2024, DOI: 10.35248/2329-9509.24.12.409

Citation: Maurcoi L (2024) Monitoring Bone Health in Diabetic Patients. J Osteopor Phys Act.12.409.

mitigate bone loss and reduce fracture risk. Management strategies may include optimizing glycemic control, ensuring adequate intake of calcium and vitamin D, and engaging in weight-bearing exercises to promote bone health. Pharmacological treatments, such as bisphosphonates, may also be considered in individuals with significant bone loss or high fracture risk. Regular monitoring of bone turnover markers can help evaluate the effectiveness of these treatments and guide adjustments in therapy.

CONCLUSION

Biochemical bone turnover markers plays an important role in understanding the impact of diabetes mellitus on bone health. Both type 1 and type 2 diabetes can lead to alterations in these markers, reflecting changes in bone formation and resorption. By monitoring these markers, healthcare providers can better assess bone health, identify individuals at risk for fractures, and implement appropriate interventions to preserve skeletal integrity in patients with diabetes.