MedicalXpress

New comprehensive review of biochemical markers of bone fragility in diabetes

July 10 2023

Credit: Unsplash/CC0 Public Domain

The risk of fragility fractures is increased in people with both type 1 and type 2 diabetes. While guidance for the evaluation and management of fracture risk in these patients has been recently proposed by an

International Osteoporosis Foundation (IOF) working group, a new review now examines a range of biochemical markers, and considers their potential role in helping clinicians further evaluate fracture risk.

Published in *The Journal of Clinical Endocrinology & Metabolism*, the review 'Biochemical Markers of Bone Fragility in Patients with Diabetes' has been authored by an expert working group of the International Osteoporosis Foundation (IOF) and the European Calcified Tissue Society (ECTS).

Professor Christian Meier, lead author and Co-Chair of the IOF Bone and Diabetes Working Group, stated, "Biochemical markers play an important role in the management of osteoporosis, but their role in diabetic bone disease is less clear. The aim of the Working Group was to evaluate the numerous biochemical markers that reflect bone and/or glucose metabolism in type 1 and type 2 diabetes and to identify which of these markers would be most valuable in assessing bone health and fracture risk and guiding patient care in diabetes."

"In our extensive review of the literature, we looked at the key findings of studies on Bone Turnover Markers (BTMs) and the effects of diabetes medications such as metformin, sulfonylureas, thiazolidinediones, incretin-based therapies, and sodium glucoses co-transporter 2 inhibitors, as well as hormones."

The review finds:

- Although bone resorption and bone formation markers are poor predictors of fracture risk in diabetes, osteoporosis drugs seem to change bone turnover markers (BTMs) in diabetics similarly to nondiabetics, with similar reductions in fracture risk.
- Several biochemical markers and hormonal levels related to bone and glucose metabolism have been correlated with bone mineral

density and/or fracture risk in diabetes, including osteocyte-related markers such as sclerostin, glycated hemoglobin A1c (HbA_{1c}) and advanced glycation end products (AGEs), proinflammatory markers, and adipokines, as well as insulin-like growth factor-1 (IGF-1) and calciotropic hormones.
- Currently, only HbA_{1c} levels seem to provide a reliable estimate of fracture risk, while BTMs could be used to monitor the effects of antiosteoporosis therapy.

Professor Serge Ferrari, Co-chair of the IOF Bone and Diabetes Working Group, added, "This review of biomarkers highlights the importance of low bone turnover in the pathogenesis of diabetic bone disease and points to alterations in bone quality as well to the most promising biochemical markers."

"Nevertheless, it is clear that further research is needed. So far only glycemic control, AGEs, and serum IGF-1 seem to have the potential for fracture prediction in patients with diabetes. Other biomarkers, such as periostin, which have been associated with bone microstructure and fragility fractures, or circulating dipeptidyl peptidase inhibitor 4, potentially associated with vascular disease in diabetes, are also under investigation."

Professor Nicholas Harvey, Chair of the IOF Committee of Scientific Advisors, concluded, "We thank the IOF and ECTS Working Group members for their valuable work and ongoing collaboration. As bone fragility is a substantial concern for individuals with diabetes, identifying which biochemical markers have the most predictive value could have far-reaching implications for the early detection and prevention of bone-related complications in these patients."

More information: Christian Meier et al, Biochemical Markers of Bone Fragility in Patients With Diabetes, *The Journal of Clinical*

Endocrinology & Metabolism (2023). DOI: 10.1210/clinem/dgad255