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Opinion Article

The Impact of Bone Mineral Density on Health

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DESCRIPTION

Growth Hormone (GH) and its trophic hormone, Insulin-like Growth Factor 1 (IGF-1), are secreted in excess in a rare endocrine condition called amenegaly. Pituitary adenomas that secrete growth hormone are the primary cause of acromegaly in most instances. The condition known as "acromegalic osteopathy" affects skeletal health in acromegaly in a variety of ways. GH and IGF-1 are traditionally thought of as anabolic hormones for bone, encouraging linear development and reaching maximal bone mass throughout childhood and adolescence. They have an impact on bone remodeling in adulthood by preserving skeletal architecture and boosting osteoblast quantity and function. GH stimulates the 1-alpha-hydroxylase enzyme in the proximal renal tubules, which facilitates the conversion of calcium and phosphorus from the stomach and kidneys to calcitriol, the active form of 25-hydroxyvitamin D.

Previous research on the state of the bones in acromegaly has produced contradictory and disputed results. When comparing acromegaly to healthy controls, some studies have observed higher areal Bone Mineral Density (BMD), whereas others have not found any difference. Despite the rise in BMD, a few studies have discovered that Vertebral Fractures (VF), which are identified on spinal radiographs and vertebral morphometry, are more common in acromegaly. This might be partially explained by the possibility that the strength of bone, which is largely dependent on its microarchitecture, is not well reflected by areal BMD. The organization of the structural components of bone, including the porosity and breadth of cortical bone as well as the form, width, and anisotropy, and connectivity of trabecular bone. Trabecular Bone Score (TBS), High-Resolution Peripheral Quantitative Computed Tomography (HRPqCT), micro CT, and micro magnetic resonance imaging (micro MRI) are a few methods for evaluating bone microarchitecture. Analyzing invasively acquired bone specimens using histomorphometric analysis is the gold standard method for evaluating the bone microarchitecture. Poor trabecular bone characteristics, such as reduced trabecular number, increased trabecular separation, and decreased bone-to-tissue volume, have been reported in studies employing HRPqCT in acromegaly. Studies using bone histomorphometry analysis have revealed that individuals with acromegaly had more trabecular separation and less trabecular number. A novel non-invasive method for evaluating bone microarchitecture is the Trabecular Bone Score (TBS). It is software that is set up on Dual-Energy X-Ray Equipment (DXA), or absorptiometry. It calculates the differences in pixels between two-dimensional (2D) lumbar spine pictures acquired from DXA images. Lower TBS values suggest weaker bone that is more prone to fractures, whereas higher TBS values indicate stronger bone with less trabecular separation. In order to compare the bone microarchitecture in acromegaly with that of healthy controls, the current study was designed to analyze the bone microarchitecture utilizing TBS. Furthermore, both groups' BMDs were assessed as part of the study.

Assessed bone microarchitecture using TBS in addition to measuring BMD in both healthy and active acromegaly controls. The TBS did not significantly differ between controls and acromegaly in our investigation. When comparing acromegaly females to control females, BMD was considerably higher in the lumbar spine, femoral neck, and whole hip, with no significant differences in variation in BMD for the distal radius. However, whereas BMD at other places was equivalent, acromegaly individuals exhibited greater femoral neck BMD than control guys. TBS did not correlate with Body Mass Index (BMI), serum GH, IGF-1, prolactin, TSH, HbA1c, or gonadal status, while BMD did correlate with BMI. Age and lumbar spine BMD were revealed to predict TBS in acromegaly using multiple regression analysis. Our research highlights the need for caution when interpreting BMD and TBS results since they are not reliable indicators of fracture risk in acromegaly. We speculate that neither BMD nor TBS alone can fully explain the multifactorial and cumulative impact of the variables contributing to the increased risk of fracture.

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