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Perspective

Effects of Obesity and Weight Loss on Bone Health

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DESCRIPTION

Osteoporosis and fractures caused by it are a global public health issue. Osteoporosis is defined by a loss of bone mass, a disruption of bone architecture, and an increased risk of fragility fractures as a result. It's more common in elderly women, and it's linked to changes in bone metabolism.

Bone metabolism regulation is complicated, involving interactions across various physiological systems. Skeletal homeostasis, in particular, is linked to energy balance and fat metabolism. Obesity, on the one hand, protects against osteoporosis and bone loss, but it also increases the risk of fractures. Furthermore, while weight loss in obese people generally improves health in the short term in the context of most co-morbidities (regardless of whether a normal healthy weight is reached or not), it can have a negative impact on bone quality, such as bone mass and density, regardless of whether a normal healthy weight is reached or not. Given the rising prevalence of obesity, it is critical to comprehend this complex link.

There are significant gaps in our understanding of the effects of obesity and weight loss on bone health. For example, the impact of parameters like age (and ageing), sex, and mechanical strain on the development and duration of obesity and body weight fluctuations is unclear, to do nothing of their importance (e.g. rapid versus gradual weight loss). Animal models are useful for investigating and characterising the consequences of many elements involved in illness development, hence filling knowledge gaps identified by human investigations. The utility of animal models, on the other hand, is totally dependent on the accuracy with which they reflect the human condition, and low translatability might lead to false findings.

Obesity is categorised as follows by the World Health Organization's Body Mass Index (BMI, kg/m^2) criteria: Overweight is defined as a BMI of 25.0 to 29.9; moderately obese is defined as a BMI of 30.0 to 34.9; severely obese is defined as a BMI of 35.0 to 39.9; and extremely obese is defined as a BMI of 40 or more. Obesity is linked to higher Bone Mineral Density (BMD) and Bone Mineral Content (BMC), which are common measurements used to quantify bone mass in humans. In fact, research show that BMD raises in lockstep with BMI. Although there is no clear BMI threshold, favourable relationships between BMI and BMD/BMC have been observed in young and elderly populations with weights ranging from normal to excessively obese. Increased mechanical load is thought to be at least one of the causes contributing to obesity's increased bone mass. Weight-bearing bones (hip, femur, and lumbar spine) are naturally subjected to more mechanical stress than non-weight-bearing bones (the upper extremities). As a result, evaluating site-specific changes in obesity response is important, not least because these weight-bearing bones are common sites of osteoporotic fracture in the elderly, particularly women. However, the relationship between mechanical strain and bone mass is not straightforward, and increased BMD in the elderly has been found at all skeletal sites in combination with obesity. In middle-aged men, BMC of the femoral neck and lumbar spine increases with rising BMI, plateauing at 35 kg/m^2, while there is no such link for radius. According to some research, BMD does not rise at non-weight-bearing areas like the radius, but favourable relationships between BMI and BMD have been documented in the radial shaft and ultra-distal radius.

This focuses on calorie restriction with or without increased exercise as the most prevalent technique to induce body weight decrease in obese adults. Differences in macro- and micronutrient contents of the diets, for example, were not taken into account.

Because of the obesity pandemic, greater attention is being paid to finding new, more effective anti-obesity medications. Therefore, it is crucial to take into account the potentially harmful effects of obesity and weight loss on bone health, as well as the complexity of factors like age and sex that should be taken into account when trying to treat or prevent unfavourable bone outcomes. Studies examining these elements as well as each person's tendency for harmful skeletal alterations are therefore urgently needed. Such data may be useful in identifying people who are "at risk," enabling concurrent preventive care or early intervention.

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