Insulin and bone health in young adults: The mediator role of lean mass

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Background: The positive relationship between lean mass (LM) and bone health is well known, but a positive association between insulin and LM has also been described. Insulin has some anabolic properties on bone through the stimulation of osteoblast differentiation, yet the role of LM as a confounder or mediator in this relationship remains uncertain. Objective: To examine whether the association between insulin levels and bone health is mediated by LM. Methods: A cross-sectional study was conducted at the Castilla La Mancha University (Spain) involving 466 young adults (113 young men; 19.5±2.3 years). LM and total-body bone mineral content (BMC) were measured by dual energy x-ray absorptiometry, and insulin was measured in fasting serum samples. Results: Young adults with high total LM had higher values of total-body BMC than their peers after controlling for age and sex, this relationship persisted after adjusting for insulin levels ($p<0.001$). In mediation analyses, insulin levels were positively associated with total-body BMC ($b = 0.05$; $p<0.001$) and total LM acted as an intermediate variable, attenuating the association between insulin levels and total-body BMC ($b = -31.98$; $p>0.05$) as indicated by Sobel test values for indirect effect ($z = 4.43$; $p<0.001$). Conclusions: LM plays an important role in the relationship between insulin levels and bone health, in such a way that while increases in LM have a positive influence on bone health, they are also negatively associated with insulin levels.