Maximum Power and Bone Variables in Young Adult Men

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Abstract : The regular practice of physical activities characterized by significant mechanical stresses stimulates bone formation and improves bone mineral density (BMD) in the most solicited sites. The purpose of this study was to explore the relationships between maximum power and bone variables in a group of young adult men. Identification of new determinants of BMD, bone mineral content (BMC) and hip geometric indices in young adult men, would allow screening and early management of future cases of osteopenia and osteoporosis. Fifty-three young adult men (18 – 35yr) voluntarily participated in this study. Weight and height were measured, and body mass index was calculated. Body composition, BMC and BMD were determined for each individual by Dual-energy X-ray absorptiometry (DXA; GE Healthcare, Madison, WI) at whole body (WB), lumbar spine (L1-L4), total hip (TH), and femoral neck (FN). FN cross-sectional area (CSA), strength index (SI), buckling ratio (BR), FN section modulus (Z), cross-sectional moment of inertia (CSMI) and L1-L4 TBS were also evaluated by DXA. The vertical jump was evaluated using a field test (sargent test). Two main parameters were retained: vertical jump performance (cm) and power (w). The subjects performed three jumps with 2 minutes of recovery between jumps. The highest vertical jump was selected. Maximum power (P max, in watts) was calculated. Maximum power was positively correlated to WB BMD ($r = 0.41$; $p < 0.01$), WB BMC ($r = 0.65$; $p < 0.001$), L1-L4 BMC ($r = 0.54$; $p < 0.001$), FN BMC ($r = 0.35$; $p < 0.01$), TH BMC ($r = 0.50$; $p < 0.001$), CSMI ($r = 0.50$; $p < 0.001$), CSA ($r = 0.33$; $p < 0.05$). Vertical jump was positively correlated to WB BMC ($r = 0.31$; $p < 0.05$), L1-L4 BMC ($r = 0.40$; $p < 0.01$), CSMI ($r = 0.29$; $p < 0.05$). The current study suggests that maximum power is a positive determinant of BMD, BMC and hip geometric indices in young adult men. In addition, it shows also that maximum power is a stronger positive determinant of bone variables than vertical jump in this population. Implementing strategies to increase maximum power in young adult men may be useful for preventing osteoporotic fractures later in life.

Keywords : bone variables, maximum power, osteopenia, osteoporosis, vertical jump, young adult men
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