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Translating high intensity loading for osteoporosis to the real world: Two year observations from The Bone Clinic

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Introduction and Aims: High intensity resistance and impact training (HiRIT) has been shown to be safe and improves bone, muscle and function in postmenopausal women with low bone mass under strict RCT conditions. The establishment of a translational research clinic, in which HiRIT is offered with systematic longitudinal monitoring, provides the opportunity to examine effectiveness, feasibility and acceptability of the program as a legitimate osteoporosis intervention in the 'real world'. The aim of the current work was to do so, by analyzing data from the first 2 years of operations.

Methods: Clients undergo comprehensive testing for height, weight, lumbar spine (LS), total hip (TH) and femoral neck (FN) bone mineral density (BMD), lean and fat mass, kyphosis angle, back extensor strength (BES), functional performance, and falls and fracture, at baseline and annually thereafter. Twice-weekly supervised HiRIT with balance training is undertaken. Compliance and injuries are recorded. Training effect was examined using within-subjects repeated measures ANOVA.

Results: We report data for 63 women (62.3±7.9yrs, 161.0±7.3cm, 59.9±11.3kg, LS T-score -1.7±1.5, FN T-score -2.2±0.8; average training compliance 78.9±30.6%). Improvement was observed in every measured parameter and reached significance for LS (4%, $P<0.0001$), TH (1%, $P<0.037$) and FN BMD (1.6%, $P<0.007$), lean mass (1.8%, $P<0.003$), functional reach (6.7%, $P<0.0001$), timed up and go (10.7%, $P<0.0001$), tandem walk (23.3%, $P<0.0001$), sit to stand (11.8%, $P<0.0001$), BES (34.9%, $P<0.0001$), kyphosis angle (3.1%, $P<0.046$), and LS T-score ($P<0.007$). There was a trend for a reduction in falls ($P<0.064$) and fracture ($P<0.051$), and a tendency for height to increase ($P<0.09$). One injury was sustained in a combined total of 5668 training sessions.

Conclusion: Bone-targeted HiRIT is safe and reduces risk for osteoporotic fracture in postmenopausal women with low to very low bone mass in a 'real world' clinical setting.