The effects of physical activity (treadmill and vibration stimulation training) on RANKL and OPG expression in bone cells, in rats with glucocorticoid-induced osteoporosis

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The aim of this study was to investigate bone tissue and plasma levels of RANKL and OPG in rats with prednisolone-induced osteoporosis and to evaluate the outcomes of physical activity on the skeletal system by treadmill and vibration platform training. Osteoporosis is a disease characterised by low bone mass and structural deterioration of bone tissue leading to bone fragility. Vibration exercise is a new and effective measure to prevent muscular atrophy and osteoporosis. The animals were divided into 5 groups. 1: control rats; 2: rats with osteoporosis receiving prednisolone; 3: rats receiving prednisolone and treadmill training; 4: rats receiving prednisolone and vibration stimulation training; 5: rats receiving prednisolone, treadmill training and vibration stimulation training. Bone evaluations used whole-body scans, histology and histomorphometric analysis. RANKL and OPG expression was evaluated by immunohistochemistry and biochemical analysis. After treatment, our data demonstrated that RANKL expression was significantly increased in groups 2 and 3 and decreased in groups 4 and 5. Conversely, OPG expression was significantly decreased in groups 2 and 3 and increased in groups 4 and 5. In conclusion, our findings suggest that mechanical stimulation inhibits the activity of RANKL. This finding provides new insights into the occurrence and progression of osteoporosis.

References

Key words
Bone, osteoporosis, glucocorticoids, RANKL, OPG, physical activity.