Hormonal responses to whole-body vibration in men.

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Abstract

The aim of this study was to evaluate the acute responses of blood hormone concentrations and neuromuscular performance following whole-body vibration (WBV) treatment. Fourteen male subjects [mean (SD) age 25 (4.6) years] were exposed to vertical sinusoidal WBV, 10 times for 60 s, with 60 s rest between the vibration sets (a rest period lasting 6 min was allowed after 5 vibration sets). Neuromuscular performance tests consisting of counter-movement jumps and maximal dynamic leg presses on a slide machine, performed with an extra load of 160% of the subjects body mass, and with both legs were administered before and immediately after the WBV treatment. The average velocity, acceleration, average force, and power were calculated and the root mean square electromyogram (EMGrms) were recorded from the vastus lateralis and rectus femoris muscles simultaneously during the leg-press measurement. Blood samples were also collected, and plasma concentrations of testosterone (T), growth hormone (GH) and cortisol (C) were measured. The results showed a significant increase in the plasma concentration of T and GH, whereas C levels decreased. An increase in the mechanical power output of the leg extensor muscles was observed together with a reduction in EMGrms activity. Neuromuscular efficiency improved, as indicated by the decrease in the ratio between EMGrms and power. Jumping performance, which was measured using the counter-movement jump test, was also enhanced. Thus, it can be argued that the biological mechanism produced by vibration is similar to the effect produced by explosive power training (jumping and bouncing). The enhancement of explosive power could have been induced by an increase in the synchronisation activity of the motor units, and/or improved co-ordination of the synergistic muscles and increased inhibition of the antagonists. These results suggest that WBV treatment leads to acute responses of hormonal profile and neuromuscular performance. It is therefore likely that the effect of WBV treatment elicited a biological adaptation that is connected to a neural potentiation effect, similar to those reported to occur following resistance and explosive power training. In conclusion, it is suggested that WBV influences proprioceptive feedback mechanisms and specific neural components, leading to an improvement of neuromuscular performance. Moreover, since the hormonal responses, characterised by an increase in T and GH concentration and a decrease in C concentration, and the increase in neuromuscular effectiveness were simultaneous but independent, it is speculated that the two phenomena might have common underlying mechanisms.

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