

THE EFFECT OF INSTABILITY RESISTANCE TRAINING ON NEUROMUSCULAR PERFORMANCE IN ATHLETES AFTER ANTERIOR CRUCIATE LIGAMENT INJURY

Abstract

The study evaluates effects on static and dynamic balance, speed of step initiation and the soccer kick after instability resistance training in athletes after ACL injury. A group of 14 soccer players (age 21.8 ± 3.4 y, height 182.2 ± 5.6 cm, and weight 76.7 ± 4.8 kg) underwent two months after rehabilitation a combined resistance and balance exercises (in duration of 30 min) for a period of 12-weeks (4-5 sessions/week). Postural stability was evaluated under both static and dynamic conditions (wobble board and antero-posterior / medio-lateral tilted platforms) during bipedal and one-legged stance. The COP velocity was registered at 100 Hz by means of posturography system FiTRO Sway check based on dynamometric platform. Speed of step initiation and the soccer kick was measured using FiTRO Dyne Premium. Pre-training measurements showed the non-injured-to-injured leg percent differences of 15.7% for static and 24.5% for dynamic balance. Following the training there were no changes in static balance on both legs (from 18.2 ± 3.3 mm/s to 15.8 ± 2.8 mm/s), on non-injured leg (from 41.3 ± 8.8 mm/s to 38.2 ± 7.8 mm/s), and on injured leg (from 49.0 ± 8.9 mm/s to 43.2 ± 7.7 mm/s). Likewise, the dynamic balance did not change while standing on both legs (from 95.2 ± 19.0 mm/s to 86.7 ± 17.8 mm/s) and on non-injured leg (from 112.3 ± 25.0 mm/s to 101.2 ± 21.8 mm/s), however a significant ($p \leq 0.01$) improvement on injured leg has been found (from 148.7 ± 22.8 mm/s to 118.0 ± 20.0 mm/s). In addition, the COP velocity significantly ($p \leq 0.05$) decreased during bipedal stance on M-L tilted platform (from 134.2 ± 20.1 mm/s to 110.6 ± 18.2 mm/s) but not on those A-P tilted (from 120.6 ± 19.7 mm/s to 104.7 ± 18.0 mm/s). Furthermore, mean run-out speed significantly ($p \leq 0.05$) increased on injured leg (from 347.4 ± 42.3 cm/s to 385.3 ± 38.8 cm/s) but not on non-injured leg (from 378.1 ± 42.1 cm/s to 371.8 ± 47.1 cm/s). However, no changes in mean kick-off speed on injured and non-injured leg have been found (from 474.0 ± 38.5 cm/s to 515.6 ± 43.3 cm/s and from 475.9 ± 40.7 cm/s to 499.5 ± 37.6 cm/s). It may be concluded that resistance exercises performed on unstable surfaces represent an effective means for the improvement of dynamic balance under various conditions and speed of step initiation in athletes after ACL injury. However more specific exercises should be implemented into training program in order to improve sport-specific skills like the kick-off speed.

Key words: athletes, ACL-injury, instability resistance training
