ALTERED GROUND REACTION FORCES DURING ANTERIOR JUMP LANDING IN SUBJECTS WITH FUNCTIONAL ANKLE ISNTABILITY

Pederson JJ, Abt JP, Keenan KA, Sell TC, Stone DA, Lovalekar MT, Lephart SM.
Department of Sports Medicine and Nutrition, University of Pittsburgh, Pittsburgh PA, USA
Contact: jjp44@pitt.edu

Study Design: Cross-sectional study. **Objectives:** To compare ground reaction forces (GRFs) between subjects with functional ankle instability (FAI) and healthy controls (CON) during an anterior jump landing. **Background:** Lateral ankle sprains (LAS) constitute a large proportion of injuries in athletics and commonly occur during jump landings. It is unclear if the timing and magnitude of GRFs in FAI subjects during anterior jump landings are different than CON. Impaired force absorption may lead to increased stress at the ankle resulting in repetitive LAS. **Methods and Measures:** Twenty-four males, twelve FAI (age, 21.5±1.4 years; weight, 84.9±7.8 kg; height, 182.2±5.7 cm) and twelve CON (age, 22.2±1.1 years; weight, 77.9±8.7 kg; height, 178.6±6.6 cm) participated. Subjects were positioned 40% of their height away from a force plate and a 30cm hurdle placed at the midpoint. Subjects jumped forward using two feet over the hurdle, landed on only the test leg, and stabilized while looking forward for five seconds. The dependent variables were anterior, posterior, medial, lateral and vertical peak GRFs, time to peak GRFs, and average GRFs from 0-150ms following initial contact. Independent *t*-tests were used to determine if differences existed between groups ($P>0.05$). **Results:** There were no significant demographic differences between groups ($P>0.05$). FAI subjects exhibited greater peak GRFs in the medial (FAI, 208.7±53.9; CON, 150.4±46.0), lateral (FAI, 267.6±140.7; CON, 155.5±89.7) and vertical (FAI, 3700.4±713.8; CON, 2817.1±815.4) directions ($P<0.05$). Additionally, FAI demonstrated faster time to peak GRFs in the lateral (FAI, 46.8±14.8; CON, 58.3±12.4) and vertical (FAI, 46.4±10.1; CON, 56.1±12.1) directions ($P<0.05$). The average GRFs from 0-150ms after initial contact were similar between groups ($P>0.05$). **Conclusion:** FAI subjects exhibited greater medial, lateral, and vertical peak GRFs and faster time to peak GRFs, placing additional demands on the ankle. To restore normal force absorption, rehabilitation programs should focus on training feed-forward control mechanisms.