Plyometric training in female athletes. Decreased impact forces and increased hamstring torques


Abstract: The purpose of this study was to test the effect of a jump-training program on landing mechanics and lower extremity strength in female athletes involved in jumping sports. These parameters were compared before and after training with those of male athletes. The program was designed to decrease landing forces by teaching neuromuscular control of the lower limb during landing and to increase vertical jump height. After training, peak landing forces from a volleyball block jump decreased 22%, and knee adduction and abduction moments (medially and laterally directed torques) decreased approximately 50%. Multiple regression analysis revealed that these moments were significant predictors of peak landing forces. Female athletes demonstrated lower landing forces than male athletes and lower adduction and abduction moments after training. External knee extension moments (hamstring muscle-dominant) of male athletes were threefold higher than those of female athletes. Hamstring-to-quadriceps muscle peak torque ratios increased 26% on the nondominant side and 13% on the dominant side, correcting side-to-side imbalances. Hamstring muscle power increased 44% with training on the dominant side and 21% on the nondominant. Peak torque ratios of male athletes were significantly greater than those of untrained female athletes, but similar to those of trained females. Mean vertical jump height increased approximately 10%. This training may have a significant effect on knee stabilization and prevention of serious knee injury among female athletes.