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Ankle and knee stability as predictors for dynamic balance

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INTRODUCTION:

The Y-balance test (YBT) is a commonly used clinical tool to predict lower extremity injury risk in athletic populations. Specifically, anterior and posteromedial reach asymmetries of 4 cm have been found to elevate injury risk [1,2]. It is unclear which factors impact YBT dynamic balance. In this study we examined whether muscle mass difference between lower limbs, joint movement during unilateral squat, or static balance during stork balance test were associated with YBT dynamic balance performance.

METHODS:

14 collegiate Division 1 female volleyball players (20.4 ± 1.8 yrs, 174.9 ± 7.6 cm, 69.7 ± 9.3 kg) completed body composition scan via dual x-ray absorptiometry, dynamic balance testing via YBT, and movement analysis via 3-D markerless DARI Motion. YBT reach distances were performed in three directions: anterior, posteromedial, and posterolateral; and difference between left and right legs was calculated. For the unilateral squat, participants were asked to stand on one leg with arms outstretched in front, then squat as low as possible. Sway during a 30-sec open-eves stork test on either leg was calculated. All assessments were conducted during one visit shortly after the team's competition season. Data were analyzed using Pearson correlation and stepwise linear regression.

RESULTS:

Average reach differences were 6.4 ± 7.1 cm for anterior, 4.4 ± 2.9 cm for posteromedial, and 3.8 ± 3.4 cm for posterolateral. Lean mass was similar in the legs (left: 7740 ± 1301 g or 62.6 ± 3.0%, right: 8070 ± 1407 g or 63.2 ± 3.2%). No significant correlations were found between YBT reach differences and leg lean mass differences (p > 0.05). Posterolateral reach difference was correlated with dynamic knee valgus (left knee r = 0.56 and p = 0.046, right knee r = 0.56 and p = 0.048) and ankle flexion (r = 0.55, p = 0.051) during the unilateral squat. No other correlations with joint angles were found. Right and left ankle medial/lateral sway during stork balance test significantly predicted anterior reach difference (r2 = 0.75, p = 0.001). CONCLUSION:

Lower limb muscle mass was not associated with dynamic balance. Ankle and knee stability seem to play a role in maintaining dynamic balance. Strength and conditioning programs should focus on ankle and knee functional dvnamics.

References: 1. Plisky et al (2006), 2. Gonell et al. (2015)

Topic:

Coaching

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