

Joint Range of Motion is Associated With Injury Risk in Women's Collegiate Soccer Players

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ABSTRACT

Range of motion as a predictor for injury in athletic population is controversial. Despite this, it is common to see strategies to improve ROM included in strength and conditioning, rehabilitation, and on-field warm up protocols. **PURPOSE:** The purpose of this investigation was to assess relationships, which may exist between joint-specific ROM and injury rates, throughout a women's NCAA Division II collegiate soccer season. **METHODS:** Twenty-eight women (age 19.7 ± 1.6 years, height $1.6 \pm .5$ m, mass 63.4 ± 7.9 kg) were assessed using a battery of ROM tests prior to a competitive season. Injury rates, types, and time lost from participation were tracked throughout the season. Injury information was coded and categorized each week in the following: acute vs. chronic, soft tissue vs. hard tissue; upper vs. lower body; specific anatomical location; contact vs. non-contact; week of injury occurrence; practice days missed from injury; and games missed from injury. Association was measured via a Spearman's rank correlation coefficient, and a stepwise linear regression was performed for any variables which showed significant correlation to determine predictive relationship, which may exist. ROM was evaluated independently by multiple rater and inter-rater reliability was high (ICC = 0.995, 95% CI upper and lower = 0.996-0.995, $p=0.000$). Statistical significance was set *a priori* at $p \leq 0.05$. **RESULTS:** Tests of hip extension and external rotation (ER); knee flexion and extension; and ankle plantarflexion (PF), dorsiflexion (DF), and inversion showed moderate to strong correlation with injury (range $r = 0.48-0.72$). Prediction equations were developed for ankle dorsiflexion ($Y=2.6-0.45(X)$, $p=0.002$); left thoracolumbar rotation ($Y=2.45-0.2(X)$, $p=0.002$); left hip ER ($Y=0.86-0.75(X)$, $p=0.02$); and left ankle PF ($Y=1.89-0.03(X)$, $p=0.02$). **CONCLUSION:** The main finding of this investigation is that multiple assessments of ROM showed association with subsequent injury in women's collegiate soccer players. While previous research on this has been less supportive, it is possible that there is a range which is appropriate for this population below which rate of injury may increase. Future investigations may wish to explore this relationship, to include potential mechanisms which may be influential in addition, while relationships between ROM and injury were not joint specific, it is possible that there are relationships of regional interdependence that may exist.