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OBJECTIVE

Running related injuries (RRI) are becoming a predominant issue among runners with authors reporting injury incidence of 19% to 92%, depending on the injury definition that is adopted.[1] Research has proposed maintaining proper biomechanics as essential to reducing the risk of lower extremity injuries. Researchers have suggested that observation and measurement of key points both in the sagittal and frontal planes during running may identify risk factors for RRI.[2,3] Others have shown that there are techniques that have been effective in modifying injury risk factors within runners once the risk factors have been identified.[4,5,6,7,8,9] If screening protocols were to be more widely employed to evaluate the risk factors for RRI, it would be important to determine the reliability of raters for such risk factors. Therefore, the purpose of this study was to examine the reliability of an experienced versus and experienced rater in the evaluation of running biomechanics using a 2-dimensional running gait analysis.

DESIGN and SETTING

Subjects were recruited from the university community, had to be free from injury, and able to complete a 10 minute run on a treadmill without limitation. All data collection was completed in a research laboratory setting.

PARTICIPANTS

This study was approved by the University Institutional Review Board and all subjects signed an informed consent prior to data collection. A total of 17 subjects, from the university community participated in the study and signed the informed consent.

INTERVENTION

Once consent was obtained, subjects entered the lab and were asked to warm up with a 5 minute jog at their preferred pace of running. After the 5 minute warm up period, the subjects were asked to select a pace that they could maintain comfortably for another 5 minutes. iPads were used to video-capture the subjects front the posterior for a frontal plane analysis, and from the side for a sagittal plan analysis. The last 2 minutes of each subjects' time on the treadmill was captured via video for analysis.

MAIN OUTCOME MEASURE

Each subject video (both the sagittal and frontal planes) was imported into the Hudl app where the video could be viewed at slower speeds and drawing tools were available to aid in the video analysis. Each subject was evaluated for several levels of the dependent variable by each assessor. Measures at initial contact and midstance were recorded in the sagittal plane. The measures at initial contact in the evaluation consisted of foot-ground angle, heel-COM distance, knee flexion angle and tibial angle. While at midstance max knee flexion and ankle dorsiflexion angle were recorded from the video data collected. In the frontal plane analysis, the variables included joint center alignment, pelvic tilt, foot-COM, knee separation, and shoe alignment. Each assessor graded each variable using an evaluation form that provided a brief description of each variable of interest, and a categorical selection under each description. For instance, for foot-ground angle, the description provided on the evaluation form was, "measure the dorsiflexion angle of the heel at initial contact." Raters then could select from 4 given categories for that variable

(heel strike, rearfoot strike, midfoot strike, forefoot strike).

RESULTS

All data was analyzed using SPSS, Inc. For each level of the dependent variable, the rating given by the inexperienced rater was compared to the experienced rater to determine reliability. The Cohen's Kappa test was used to determine the level of agreement between raters in evaluating running gait using 2-dimensional analysis. The results indicated good to very good agreement in 8 out of the 12 variables. Kappa scores of 0.80-1.00 indicated very good agreement, and Kappa scores of 0.60-0.80 indicated good agreement. In 7 out of the 17 subjects, the raters agreed on 11 out of the 12 variables scored (92% agreement). In 5 out of the 17 subjects, the raters agreed on 10 out of the 12 variables scored (83% agreement).

CONCLUSION

The results of this study indicated that the inexperienced rater had significant agreement with the experienced rater for given variables related to RRI risk factors using a 2-dimensional analysis. These findings are important for clinical considerations relating to pre-season or preventative screening models. The ability to use less experience raters to reliably identify injury risk factors would enable a greater volume of runners to be screened with less overall cost.

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