Pre-Season Characteristics of College Athletes as Predictors of Musculoskeletal Injury Risk
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BACKGROUND AND PURPOSE
- Medial longitudinal arch (MLA) height appears to be a factor that is related to lower extremity injury susceptibility.
- Foot Width Index (FWI) is the ratio of narrowest middle 1/3 to widest distal 1/3 of the foot (Choppas-Smirk index)¹
- Low MLA: ≥ .40; normal MLA: .30 - .39; high MLA: ≤ .29
- FWI outside normal range, higher or lower, has been shown to increase both acute and chronic injury risk
- FWI, derived from a footprint, may be superior to the predictive model can be used to identify a high risk group of players
- The purpose of this study was to assess the FWI as a pre-season predictor of injury occurrence in college athletes

SUBJECTS AND PROCEDURES
- 85 NCAA Division I-CFB Football Players
- Age: 19.7 ± 1.5 years; Height: 1.85 ± 0.08 m; Weight: 122.06 ± 19.90 kg
- Footprint obtained from imprint device (Euro International, Inc., Tampa; Figure 1) prior to first practice session
- Implant applied to undersurface of rubber plate of imprint device
- Participant stepped on rubber panel with right foot; equal standing pressure distribution between feet
- Choppas-Smirk foot width index (FWI) derived from foot imprint (Figure 1)²
- Widest portion of distal 1/3 of footprint measured (line A)
- Narrowest portion of middle 1/3 of footprint parallel to line A (line B)
- FWI = line B / line A

RESULTS

• The ≥ 0.475 FWI cut point identified by this analysis for injury prediction was slightly greater than the ≥ 0.40 value reported by Mei-Dan¹ as a threshold for categorization of low MLA height
• The 0.475 FWI cut-point identified by this analysis for injury prediction was slightly greater than the ≥ 0.40 value reported by Mei-Dan¹ as a threshold for categorization of low MLA height

- Relative predictive power of FWI compared to that of other pre-participation measures of injury risk:
  - Anatomic components: Body Mass Index (BMI), Estimated Mass Moment of Inertia (MMI)
  - Core muscle endurance: Trunk Flexion Hold (TFL), Wall Sit Hold (WSH), Horizontal Trunk Hold (HTH)
  - Joint function surveys: Oswestry Disability Index (ODI), Foot and Ankle Ability Measurement score (FAAM), International Knee Documentation Committee knee function score (IKDC)
  - Neurocognitive performance: ImPACT™ test battery

- Predispensing factors: Injury history and high frequency of exposure to game conditions
- Receiver operating characteristic (ROC) analysis utilized to establish dichotomization cut-off for each variable
- Fishers’s exact test, odds ratio (OR), and relative risk (RR) were used to assess associations with injury occurrence
- Backward stepwise logistic regression analysis used to identify a set of 3-5 strongest predictors

REFERENCES

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7. Smirak, R. Footprint analyses between thirty and fiftynine years of age. Foot Ankle. 1990;11:103-108