ANATOMICAL AND BIOMECHANICAL ASSESSMENTS OF MEDIAL TIBIAL STRESS SYNDROME

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Objective: Limited research has been conducted on medial tibial stress syndrome (MTSS) with no clear agreement on which static or dynamic factors are contributory. The purpose of this study was to determine if selected anatomical and biomechanical differences existed between MTSS and non-injured controls. Design and Settings: A one-factor research design was used: group (MTSS and non-injured control). Dependent variables were foot and ankle flexibility measures, foot type, and initial pronation index. Subjects: 33 participants (15 males, 18 females): 14 with MTSS (height: 175.34 ± 2.17cm; weight: 70.45 ± 2.37kg; age: 22.71 ± 3.83 years) and 19 non-injured controls (height: 176.22 ± 1.92cm; weight: 71.81 ± 2.86kg; age: 24.84 ± 4.14 years). Participants were required to be physically active in weight-bearing activity at least 3 times a week for no ≤30 minutes each session. MTSS participants were diagnosed clinically by a licensed podiatric physician. Measurements: Foot and ankle flexibility measures were determined via manual goniometry: active ankle dorsiflexion with the knee at 0° extension and 90° flexion, passive extension of the first metatarsophalangeal joint in weight bearing and non-weight bearing, and arch height index ratio (Williams & McClay, 2000). Foot type was determined statically via the malleolar valgus index (Song et al., 1996) and dynamically via the center of pressure excursion index (Song et al.). A new dynamic measure, initial pronation index, was assessed to determine the initial center of pressure angle and slope of the subtalar joint during the first 30 ms of stance (Cavanagh, 1987). Investigator intrarater measurement reliability for all dependent variables was ICC ≥ .95. All ambulatory data were collected during self-selected cadence locomotion. Data were analyzed with one-way ANOVA models (p ≤ .05). Activity level, body mass index, and limb length discrepancy were analyzed as potential covariates (when r > .60). Results: ANOVA models revealed that MTSS participants had significantly greater visual analog pain levels at rest (p=.001) and during exercise (p=.001) and a slower gait velocity (p=.02) than controls. None of the dependent variables were statistically significant. Limb length (controls: .09 ± .11cm; MTSS: .25 ± .13cm; p=.051) and ankle dorsiflexion at 0° knee extension (controls: 7.16 ± 6.2°; MTSS: 5.46 ± .72°; p=.08) demonstrated strong linear trends. Conclusions: Specific anatomical, biomechanical, and other factors contributing to MTSS have yet to be determined. Static and dynamic measurements are important to determining the etiology of MTSS, but these too remain elusive. Testing of other intrinsic and extrinsic factors (e.g., magnitude of load, shoe utilization, type, and design) should be considered. Further investigation of all these factors can lead to better strategies for the prevention and clinical intervention of MTSS.

Key Words: shin splints, risk factors