The Influence of Lumbopelvic Function on Perceived Ankle Function in Individuals with Chronic Ankle Instability

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Introduction

- Individuals with chronic ankle instability (CAI) display impairments via patient-reported outcomes (PROs).
- Often, CAI results in reduced self-reported function via the Foot and Ankle Ability Measure (FAAM), increased fear injury-related fear via the Tampa Scale of Kinesiophobia (TSK-11) and Fear-Avoidance Beliefs Questionnaire (FABQ), and reduced balance ability via the Self-Efficacy of Balance Scale (SEBS).[1]
- However, the relationship between impaired PROs and clinician-oriented outcomes have yet to be explored in individuals with CAI.
- Hip and trunk neuromuscular impairments have been considered as critical factors that can cause decreased postural stability and malpositioning of the lower extremity in those with CAI.[2,3]
- Identifying the relevance between reduced lumbopelvic function and impaired sensory-perceptual outcomes might direct clinicians to novel methods of improving perceived ankle function and reducing fear in patients with CAI.

Purpose

To examine the relationship between lumbopelvic function and PROs that assess self-reported function, balance self-efficacy, kinesiophobia, and fear avoidance beliefs in individuals with CAI.

Methods

- We recruited 33 individuals with CAI (F:18, M:15, 22.8±3.4yrs, 169.8±8.4cm, 77.4±13.4kg)
- Inclusion Criteria
  - Age 18-40 years old
  - At least 30 minutes of physical activity 3x/week
  - Met the International Ankle Consortium's criteria for CAI[4]
- Exclusion Criteria
  - A history of balance or vestibular disorders
  - Previous spine or lower extremity fracture or surgery
  - Low back pain in the previous 6 months
  - Concussion in the previous 6 months
  - Spine and lower extremity musculoskeletal and neurovascular disorders in the previous 2 years

Methods

- Participants completed the following PROs at the beginning of a single laboratory session
  - Foot and Ankle Ability Measure - Activity of Daily Living (FAAM-ADL) & Sport (FAAM-S)
  - Tampa Scale of Kinesiophobia (TSK-11)
  - Fear-Avoidance Beliefs Questionnaire - Work (FABQ-W) & Physical Activity (FABQ-PA)
  - Self-Efficacy of Balance Scale (SEBS)
- We assessed transversus abdominis (TA, Figure 1) & lumbar multifidus (LM, Figure 2) contractility with a Sonosite M-MSK Portable Diagnostic Ultrasound unit and linear-array transducer (FUJIFILM Sonosite, Inc, Bothell, WA)
  - Mean thickness was calculated for 3 trials at rest and 3 trials in a contracted condition
  - A percent change in contraction thickness between rested and contracted conditions was computed: $\mathbf{(mean_{contracted} - mean_{rested})/mean_{rested} \times 100}$
- Each participant completed a single trial of four lumbopelvic stability tests (Figures 3-6).

Fig 1. TrA Contractility

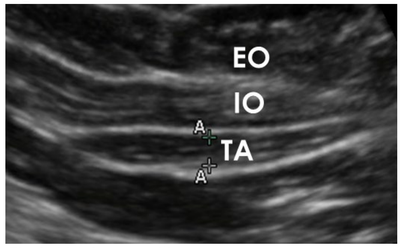

Fig 2. LM Contractility

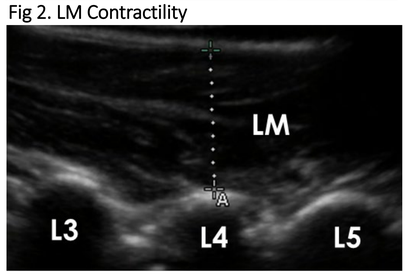

Fig 3. Single-Leg Bridge

Fig 4. Trunk Flexion Endurance

Fig 5. Beiring-Sorensen

Fig 6. Side Plank

- Each participant completed 3 trials of 3 isometric hip strength tests (Figures 7-9). Hip extension, abduction, and external rotation were measured using a hand-held dynamometer.

Fig 7. Hip Extension

Fig 8. Hip Abduction

Fig 9. Hip Ext Rotation

- Statistical analysis
  - Pearson product moment correlations were used to identify the relationship between lumbopelvic function and patient-reported outcome scores.
  - Separate backward linear regression analyses assessed the degree of each PRO score variance explained by the tests of lumbopelvic function.
  - Alpha was set a priori at P<0.05.

Results

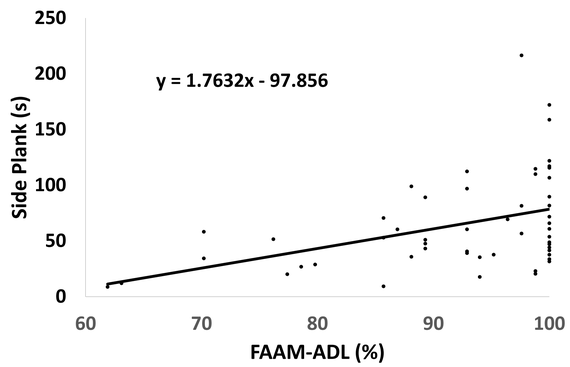

Figure 1. Correlation between FAAM-ADL & Side Plank

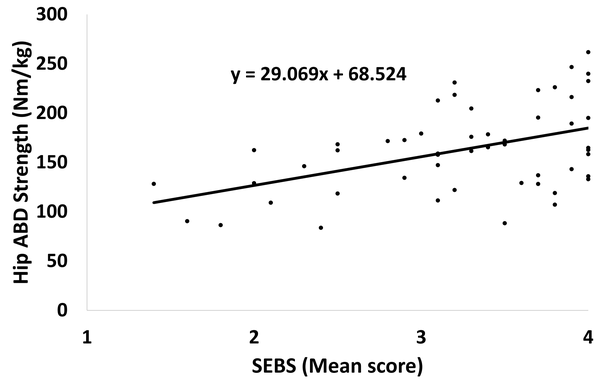

Figure 2. Correlation between SEBS & Hip Abduction Strength

Results

- The side plank endurance test was moderately correlated with the FAAM-ADL. The linear regression model indicated that the side plank endurance test explained 20% of FAAM-ADL (r=.451, R^2=0.20, P<0.01).
- The isometric hip abduction strength was moderately correlated with the SEBS. The linear regression model indicated that the isometric hip abduction strength explained 29% of SEBS (r= .540, R^2=0.29, P<0.01).
- No other significant relationships between lumbopelvic function (trunk muscles contractility, lumbopelvic stability, and isometric hip strength) and ankle-specific PROs were identified.
- No other significant relationships between lumbopelvic function (trunk muscles contractility, lumbopelvic stability, and isometric hip strength) and PROs regarding fear of movement or re-injury were identified.

Conclusions

- Our data suggests that deficits in hip abductor function are related to low levels of perceived ankle function and balance self-efficacy in individuals with CAI.
- Hip strengthening exercises have previously resulted in improved isometric hip strength, balance performance, and self-reported function in individuals with CAI.[5]
- Therefore, patients may benefit from rehabilitation that includes a concentration on lumbopelvic stability and strength of hip abduction, as it may help address reduced patient-reported function as well as perceived postural impairments in individuals with CAI.

References

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