EFFECT OF A SINGLE SHORT ELECTROSTIMULATION SESSION OF THE FIBULARIS MUSCLES ON DYNAMIC POSTURAL STABILITY AND EVERTOR MUSCLES STRENGTH

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Background The fibularis muscles are key elements of the ankle evertor group (evertors). The weakness of evertors is one of the main cause of ankle sprains. Electrostimulation training can increase the maximum voluntary force of contraction by neural adaptation to a healthy skeletal muscle.

Objective To assess whether a single electrostimulation session of the fibularis muscles could impact dynamic postural stability and evertor strength.

Design Single-blind randomised controlled trial.

Setting Motion analysis laboratory in a hospital facility.

Patients (or Participants) Sixteen healthy male and female volunteers, randomly assigned to an experimental (EXP, n=8) or control (Control, n=8) group.

Interventions (or Assessment of Risk Factors) Participants in EXP received a single electrostimulation strengthening session for 3 minutes on the dominant side (DOM) fibularis muscles. Control participants received a sham electrostimulation on DOM with similar modalities.

Main Outcome Measurements Dynamic postural balance was assessed on DOM and non-dominant (NDOM) limbs using the modified Star Excursion Balance Test (SEBT). A composite score (CS in%) was calculated. Evertor strength (in N) was assessed with three maximal isometric voluntary contractions on an isokinetic dynamometer.

Results EXP displayed a significant increase in SEBT-CS on DOM (97.7±5.9% vs 96.1±7.4%, p<0.05) and NDOM (97.6±7.2% vs 95.6±7.4%, p<0.01), while these parameters did not change in Control. EXP also displayed a significant increase in Evertors isometric strength on DOM (25.0±7.0N vs 23.1±6.8N, p<0.05) and NDOM (26.8±6.0N vs 22.9±5.2N, p=0.001). In Control, evertor isometric strength increased on DOM (24.9±7.4N vs 23.1±6.8N, p<0.01), but remained unchanged on NDOM.

Conclusions A short single fibularis electrostimulation session on one leg appeared to improve dynamic postural stability on both sides and evertors strength on the stimulated side only, suggesting a global post-activation potentiation effect of this intervention and a possible additional mirror effect on dynamic postural stability. These findings may be of interest for preventing ankle sprain.

ASSOCIATION BETWEEN ANKLE SPRAIN HISTORY AND ANKLE SPRAIN INCIDENCE IN NATIONAL BASKETBALL ASSOCIATION GAMES

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Background Altered muscle activation pattern and ground reaction force (GRF) in those with ankle instability (AI) should be clearly investigated in order to incorporate this information to retrain AI patient.

Objective To investigate muscle activation characteristics of AI patient and GRF pattern.

Data Sources Relevant studies were searched from PubMed, CINAHL, SPORTDiscus, and Web of Science through May 2019. Combination of keywords ankle instability, chronic ankle instability, ankle sprain, biomechanics, kinematics, electromyography, and landing were used to search relevant studies.

Study Selection Inclusion criteria for study selection were: 1) subjects with chronic ankle instability, functional instability, mechanical instability or recurrent ankle sprains; 2) the primary outcomes consisted of muscle activation of the lower extremity and GRF during landing; 3) peer-reviewed articles with full-text; and 4) providing appropriate information, which is mean, standard deviation, and sample size to re-analyse data.

Data Extraction Extracted data included muscle activation of the lower extremity (root mean square; integral EMG; mean), the magnitude, and time to peak GRF and was used to calculate standardized mean differences (SMD) with 95% confidence intervals (CIs).

Data Synthesis A total of twelve relevant studies (Oxford Centre for Evidence-Based Medicine level 3b) included in this study. The peroneal muscle was less activated in AI compared to control before landing (SMD=-0.59, p<0.01, CIs=-0.91, -0.27). AI had greater peak vertical GRF (SMD=0.21, p=0.03, CIs=0.02, 0.41) and exhibited shorter time to peak vertical GRF (SMD=-0.63, p<0.01, CIs=-0.85, -0.41) than those of control during landing (SMD=-0.63, p<0.01, CIs=-0.85, -0.41).

Conclusions Muscle recruitment training of the peroneal muscle may diminish the risk of the recurrent ankle sprain in addition to other lower limb injuries. The peroneal muscle could provide a sufficient range of plantar flexion to decrease vertical GRF and eversion of the subtalar joint. Therefore, peroneal muscle training may be a key factor to retrain for the altered landing strategy resulting in ankle instability.
Assessment of Risk Factors History of ankle sprain in the past year was defined in a time-dynamic manner as any bilateral ankle sprain (game or non-game) in the 365 days prior to the game of interest. Hazard ratios (HR) and 95% confidence intervals (CI) were calculated while controlling for years in the NBA, body mass index, and average NBA minutes played in the prior year.

Main Outcome Measurements All acute-onset ankle sprains reported in games were identified from the NBA standardized electronic medical record (n=30 teams).

Results Across this 4-season study, 482 incident ankle sprains were reported in NBA games among 681 players and 2,517,549 player-minutes. Of the players that sustained an incident sprain, 44% (n=211) had at least one ankle sprain in the prior year. Compared to players with no sprains in the past year, the risk of incident ankle sprain increased with increasing number of prior ankle sprains; a 28% increase in risk (adjHR=1.28, 95% CI 1.03, 1.58) with one prior sprain, a 51% increase in risk (adjHR=1.51, 95% CI 1.10, 2.04) with two prior sprains, and a 100% increase in risk (adjHR=2.00, 95% CI 1.31, 2.94) with three or more prior sprains.

Conclusions History of ankle sprain in the past year was associated with increased risk of incident ankle sprain among NBA players. 44% of players had at least one ankle sprain (game or non-game) within one year prior to the incident sprain.