It was reported that in same sports program and training intensity, knee and ankle injury in female is 2-8 times higher than males. The decline of posture control is an important cause for sports injuries. Postural control is accomplished by the combination of proprioception, central and neuromuscular control. Proprioception is a crucial component in maintaining the body stability.

PURPOSE: The purpose of this study was to investigate whether there exist gender differences in knee and ankle proprioception between male and female in follicular cycle.

METHODS: Twenty-four healthy college student (male: n=12, age: 23.08±1.8 years; height: 1.73±0.07m; weight: 59.8±12.6kg; female: n=12, age: 21.75±1.77 years; height: 1.64±0.64m; weight: 56.2±5.7kg) were included in the study. Knee and ankle proprioception were measured by an electric-driven movable frame which was moved by an electric motor rotated the foot on an axis at a rate of 0.4°/s. The test results were averaged from five times movement in each direction such as knee flexion and extension; plantarflexion, and dorsiflexion in ankle joint. The independent t test was used to compare differences between proprioception of ankle and knee joint in males and follicular females. The significance level was p<0.05.

RESULTS: There were no significant differences between proprioception of plantarflexion (male: 0.78±0.26 °; female: 0.65±0.27 °, p=0.215) and dorsiflexion (male: 0.64±0.18 °; female: 0.62±0.33 °, p=0.872) between males and follicular females. No significant differences were found on knee flexion (male: 0.54±0.21 °; female: 0.54±0.32 °, p=1.000) and extension (male: 0.55±0.23 °; female: 0.43±0.17 °, p=0.132) in male and follicular female.

CONCLUSIONS: There were no significant gender differences on ankle and knee proprioception. Therefore, proprioception may not be the cause of the decline in posture control of female.

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**Altitude Training Mask Alters Ankle Joint Kinetics During Treadmill Walking**

Elevation training masks are commonly used in strength and conditioning to simulate working in a hypoxic environment through resisted inspiration (RI). It is further suggested that RI improves the ability of the athlete’s muscle to utilize available oxygen carried by hemoglobin. Though some data exists regarding gross training performance in elevation training masks, little data is available regarding the effect of elevation training masks on lower extremity joint biomechanics during an exercise task.

PURPOSE: To determine the effects of an altitude training mask on ankle joint kinetics during a treadmill walking task.

METHODS: Seven healthy young adults performed two 10-minute treadmill walking tasks at 1.6 m/s in each of two conditions: normal walking (CON) and with RI. Three-dimensional kinematics and ground reaction forces (GRFs) were simultaneously recorded using a 6-camera motion capture system (250 Hz) and instrumented treadmill (1500 Hz). Peak ankle plantarflexor moments and powers were determined from the second (M2) and tenth (M10) minutes of the treadmill walking task. Two repeated measures ANOVAs were used to determine the effects of time and condition on peak plantarflexor moments and powers.

RESULTS: No time by condition interactions were observed for plantarflexor moments (p = 0.26) or powers (p = 0.18). The RI condition was associated with greater plantarflexor moments (p = 0.04) and powers (p = 0.01) than the CON condition. No effects of time were observed for plantarflexor moments (p = 0.84) or powers (p = 0.63).

CONCLUSIONS: These findings demonstrate that ankle joint kinematics are greater when performing a treadmill walking task when wearing an elevation training mask. Given the constant mechanical demand, these data suggest that a multi-joint mechanical adaptation occurred in response to the elevation training mask. Subsequent research may seek to address changes in joint contributions to the walking task when wearing an elevation training mask.

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**Altitude Training Mask Alters Ankle Joint Kinetics During Treadmill Walking**

Table 1. Mean ankle joint moments and powers during stance phase propulsion in the secondary (M2) and tenth (M10) of the CON and RI conditions.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Moment</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M2</td>
<td>M10</td>
</tr>
<tr>
<td>CON</td>
<td>-1.24 (0.32)</td>
<td>-1.25 (0.34)</td>
</tr>
<tr>
<td>RI</td>
<td>-1.35 (0.35)</td>
<td>-1.31 (0.35)</td>
</tr>
</tbody>
</table>

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**Influence Of Ankle Flexibility On The Single Leg Balance Test Using A Dynamic Balance System**

Ankle range of motion (ROM) is believed to be one of the contributing factors in balance deficits. Multiple studies have investigated balance in reference to vision, strength, vestibular function, proprioception, and sensation. However, most of these studies have utilized geriatric, athletic, or injured populations focusing on static balance measures.

PURPOSE: Although there are multiple factors that play a role in balance, the purpose of this study was to assess the influence of ankle flexibility on dynamic single leg balance in fit and unfit males.

METHODS: Twenty-five male subjects (age = 22 ± 2 years; ht. = 179 ± 7 cm; wt. = 85.6 ± 15 kg) were recruited for this study. Ankle flexibility (which includes dorsiflexion, plantarflexion, eversion, and inversion) was measured in degrees for both legs with a goniometer. Subjects then completed four trials, of which the first two trials were familiarization, of the single leg balance test for each leg on a dynamic balance system. Mean stability index (SI) was calculated for the last two trials and both a Pearson Correlation and Independent T-test were utilized.

RESULTS: No significant correlations between overall stability and dorsiflexion (p = 0.899), plantarflexion (p = 0.790), eversion (p = 0.704), and inversion (p = 0.550) on the left and right ankle were present (p < 0.05). However, there was a significant correlation between inversion of the left ankle and medial/lateral SI (p = 0.022); and between dorsiflexion of the left ankle and anterior/posterior SI (p = 0.049). No significant differences for ankle flexibility or SI occurred between unfit and fit individuals (p > 0.05).

CONCLUSION: Results suggest ankle ROM may be a contributing factor in dynamic balance on the non-dominant leg.

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**The Relationship Between Perception Of Ankle Instability And Dynamic Balance In Individuals With A History Of Ankle Sprains**

Ankle sprains are common injuries which can progress to chronic ankle instability (CAI) and balance impairments. While objective data guide treatment for individuals with CAI, the patient’s subjective experience is often overlooked and not counted in the adoption of plan of care. Individual perception of ankle instability is an important factor and has the potential to influence presentation of sensorimotor impairments either through neuromotor or fear-avoidance mechanisms. The purpose of this study was to explore the contribution of perception of unilateral and bilateral CAI on a dynamic balance test.

METHODS: Subjects were males and females 18-35 years old (n=25, age<23.8 ± 1.8 yr.). All subjects completed the Cumberland Ankle Instability Tool (CAIT) to measure perceived ankle instability (lower CAIT scores are associated with greater perceived instability). Dynamic balance was assessed using 3 repetitions in each direction (anterior, postero-medial, and postero-lateral) of the Y-Balance Test (YBT). Asymmetries in CAIT scores and reach distances were calculated by subtracting right leg values from left leg values. Further comparisons were analyzed between groups of bilaterally highest (>80%) and lowest (<20%) combined CAIT scores.
RESULTS: There was a significant positive moderate correlation between CAIT asymmetries and asymmetries in the anterior reach (r=0.526, p=0.007) and the postero-medial reach scores (r=0.554, p=0.004). Significant differences were found between participants with the highest (n=5) and lowest (n=5) bilateral CAIT scores in right postero-medial reach (101.60 ± 9.91 vs 86.80 ± 5.89, p=0.02), right postero-lateral reach (96.40 ± 7.70 vs 76.80 ± 4.87, p=0.001), and right composite score (89.96 ± 5.93 vs 78.44 ± 3.85, p=0.007).

CONCLUSION: Subjects reporting increased perceived ankle instability demonstrated decreased YBT performance on the side of perceived instability. Decreased reach distances may be attributable to neuromuscular consequences of ankle injury, changes in movement strategy associated with apprehension, or both. In fact, the larger the perceived asymmetries the greater the performance deficits. These findings may help clinicians contextualize sensorimotor assessment results in patients with a history of ankle sprain.

387 Board #203 May 27 9:30 AM - 11:00 AM
Static Platform Model Evaluation For Study Of Sudden Ankle Movement.
Leandro Santos, Júlia Greve, Angélica Alonso, Raul Bolliger, César Augusto. Universidade de São Paulo, São Paulo - SP, Brazil.
Email: leandro.dias@usp.br
(No relationships reported)

PURPOSE: Ankle sprains are very common in sports and can cause joint instability with clinical and performance consequences. The sudden ankle inversion platform that simulates the sprain movement evaluates the movements performed associated with the electromyography of the fibular and anterior tibial muscles. The aim of this research is to develop a sudden ankle inversion platform limited to 15º medial rotation, 20º plantar flexion, 20º inversion, and to evaluate the mechanical sprain movement associated with the electromyographic response of the fibular and anterior tibial muscles of soccer players.

METHODS: A total of 30 soccer players between 16 and 19 years old without history of ankle sprain were studied at the ankle assessment platform. Each athlete was randomly subjected to ankle sprain movement on the platform for 10 repetitions (five on each limb), associated with electromyography of the anterior tibial and fibular muscles. Friedman statistical tests were performed with related samples of nonparametric quantitative data, in cases where there was significance (p<0.05) Dunn's post-test was performed.

RESULTS: There was no statistical difference (p>0.05) between latency of movement (0.9 ± 0.2 ms) and to reach the maximum range of motion during plantar flexion (78 ± 4.2 ms) and medial rotation (120 ± 2.3 ms). There was an increase in the angular velocity of inversion (p<0.05) during the attempts (230 ± 20.6 º/s). There was no difference (p>0.05) in latency time of the anterior tibial (25± 5.2 ms) and fibular muscles (33± 4.1 ms).

CONCLUSION: The sudden static platform was reliable to evaluate the movements performed by the ankle during mechanical sprain, with no difference in the mechanical and electromyographic behavior evaluated during the 10 repetitions.