The Relationship between Center of Pressure and Body Mass Index in Individuals with Chronic Ankle Instability

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Context

- Chronic Ankle Instability (CAI) is a frequent and serious repercussion of lateral ankle sprains.1,2,3
- Individuals with a larger BMI may have a higher risk of developing CAI due to requiring more displacement to maintain postural balance.3,4
- Those with CAI have also been shown to have differences in center of pressure (COP) while maintaining postural stability compared to healthy controls.3 However, no analysis has been performed to determine if body mass index (BMI) has an effect on the COP of individuals with CAI.

Objective

- To identify differences between COP and BMI among control, coper, and CAI participants and examine the relationship between COP and BMI across the groups.

Participants

- 45 subjects participated in this study (Table 1).
- 15 were healthy controls without history of ankle injury. 15 were coper’s with a history of ankle injury but no reported instability, and 15 had self-reported CAI.

Table 1. Demographic Data. CAIT=Cumberland Ankle Instability Tool.

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Age (yrs)</th>
<th>Height (m)</th>
<th>Mass (kg)</th>
<th>CAIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>15</td>
<td>22.7±2.3</td>
<td>1.71±0.1</td>
<td>74.9±12.6</td>
<td>29.9±0.35</td>
</tr>
<tr>
<td>Coper</td>
<td>15</td>
<td>22.1±1.2</td>
<td>1.72±0.1</td>
<td>71.1±12.6</td>
<td>28.4±1.12</td>
</tr>
<tr>
<td>CAI</td>
<td>15</td>
<td>22.6±3.4</td>
<td>1.70±0.1</td>
<td>70.2±15.4</td>
<td>17.4±5.7</td>
</tr>
</tbody>
</table>

Interventions

- Participants completed the Cumberland Ankle Instability Tool (CAIT) and an ankle history questionnaire prior to testing.
- All participants performed a single-leg balance test on a Neurocom Balance Master System 8.4 force platform (100Hz) for 60 seconds.

Main Outcome Measures

- BMI, center of pressure range (COP-R) and velocity (COP-V) in the anterior-posterior (AP) and medial-lateral (ML) directions were calculated.
- Differences (p≤.05) in demographic data and COP measures among groups were assessed via an analysis of variance (ANOVA).

Results

- There were no significant differences in BMI or COP variables among groups.
- BMI was significantly, moderately correlated with deviations in COP-R ML in individuals with CAI (r=0.451, p=0.05).

Table 2. Means and standard deviations between COP-R and COP-V among groups. *p<.05

<table>
<thead>
<tr>
<th>Groups</th>
<th>BMI (kg/m²)</th>
<th>COP-R (mm)</th>
<th>COP-V (mm/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>ML</td>
<td>AP</td>
</tr>
<tr>
<td>Control</td>
<td>25.5±3.9</td>
<td>30.16±7.1</td>
<td>37.3±8.7</td>
</tr>
<tr>
<td>Coper</td>
<td>23.9±2.7</td>
<td>30.8±6.1</td>
<td>41.6±11.7</td>
</tr>
<tr>
<td>CAI</td>
<td>24.2±3.9</td>
<td>30.8±5.0*</td>
<td>42.1±13.9</td>
</tr>
</tbody>
</table>

Conclusion

- A moderate correlation existed between BMI and ML COP-R postural control in those with CAI. This correlation did not exist in control and in coper groups.
- Thus, BMI may be a moderator of poor postural stability, potentially compounding deficiencies frequently observed in those with CAI.
- Further research is necessary in order to fully explore this relationship between BMI and COP to identify if reducing BMI improves outcomes in individuals with self-reported CAI.

References