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.[1,3]
- Those with CAI have also been show 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.

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

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 ($p \leq .05$) 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 across 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

		COP-R (mm)		COP-V (mm/sec)	
Groups	**BMI (kg/m²)**	**ML**	**AP**	**ML**	**AP**
Control	25.5±3.9	30.16±7.1	37.3±8.7	-0.02±0.1	-0.07±0.2
Coper	23.9±2.7	30.8±6.1	41.6±11.7	-0.04±0.1	-0.07±0.1
CAI	24.2±3.9	30.8±5.0*	42.1±13.9	0.00±0.1	-0.08±0.1

Figure 1. Photos of subject performing single-leg balance test inside of the Neurocom.

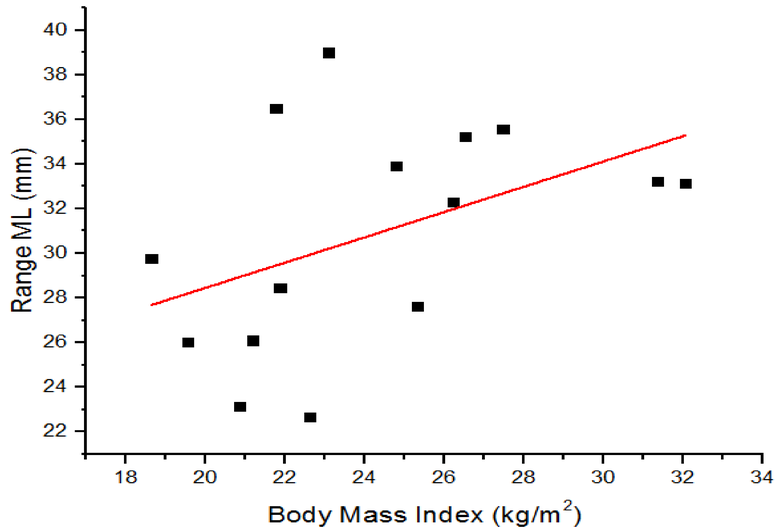

Figure 2. Scatter plot depicting the relationship between ML COP-R and BMI (r = 0.451).

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

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