Lateral Dominance in Strength and Stability among Higher Education Students

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Abstract

Purpose: Lateral dominance influences motor performance in various physical tasks, with the dominant side typically demonstrating superior strength capabilities. Dominance could affect different fitness components, particularly the relationship between strength and postural stability. This study aimed to investigate the differences between dominant and non-dominant sides in handgrip strength and single leg stability performance among first-year university students to better understand how lateral dominance manifests across different motor control systems.

Methods: Twenty-nine healthy higher education students (15 male and 14 female, height 172.6 ± 8.8 cm; weight 69.2 ± 9.6 kg; age 20.5 ± 1.9 years) were recruited from a first-year of physiotherapy university class. All subjects were right leg and hand dominant. Students were tested for fitness and health parameters using two different tests: dominant and non-dominant handgrip strength and single leg stability. Handgrip strength measured the maximum force production while grasping the dynamometer, the force was expressed in kilograms. Single leg tests measured the sway path length and the oscillation area during 10 seconds single leg standing. Data analysis included descriptive statistics and a paired t-test analysis between dominant and non-dominant sides to identify differences between the dominance behavior of strength and stability determinants. The significance level was set at $P < 0.05$.

Results: Dominant handgrip force production was significantly higher compared non-dominant (40.5 ± 10.6 kg and 39.0 ± 10.3 kg, respectively; $p = 0.019$) but no differences were measured between dominant and non-dominant sides for single leg stability. Sway path length in dominant and non-dominant sides was very similar (32.4 ± 9.8 cm and 31.8 ± 14.5 cm, respectively; $p = 0.808$), as well as oscillation area in dominant and non-dominant sides (22.4 ± 16.6 cm2 and 16.7 ± 19.4 cm2, respectively; $p = 0.160$).

Conclusions: The findings demonstrate that lateral dominance significantly affects handgrip strength but not single leg stability in young university students. While the dominant hand showed superior force production capabilities, postural control during single leg stance appeared to be equally developed bilaterally. These results suggest that dominance patterns may be task-specific and that balance training programs should consider bilateral development, whereas strength training may benefit from addressing potential asymmetries between dominant and non-dominant sides.