

Contributing factors to postural stability in Prader-Willi syndrome

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Abstract

Background: Prader-Willi Syndrome (PWS) is a rare neurodevelopmental disorder affecting multiple functional parameters. This study examined postural stability and associated gait and neuromuscular factors in young adults with PWS.

Methods: Participants included 10 adults with PWS [7 M/3F; Body Fat % 40.61 ± 7.79]; ten normal weight (NW) adults [7 M/3F; Body Fat % 23.42 ± 7.0]; ten obese (OB) adults [7 M/3F; Body Fat % 42.40 ± 5.62]. Participants completed the Sensory Organization Test (SOT)[®]. Condition (C) specific and a composite equilibrium score (CES) were calculated (maximum = 100). Quadriceps strength was assessed using an isokinetic dynamometer. Three-dimensional gait analyses were completed along a 10 m walkway using a motion capture system and two force plates. A gait stability ratio (GSR) was computed from gait speed and step length (steps/m).

Results: The PWS group had lower scores for C1, C3, C4 and CES compared to the NW ($p < .039$ for all) and lower scores for C4 and CES than the OB ($p < .019$ for both) groups, respectively. In C5 (eyes closed, sway-referenced support) and C6 (sway-referenced vision and support), 33.3% of participants with PWS fell during the first trial in both conditions ($X^2 [2] 7.436, p = .024$) and ($X^2 [2] 7.436, p = .024$) but no participant in the other groups fell. Those with PWS showed higher GSR than participants with NW ($p = .005$) and those with obesity ($p = .045$).

Conclusion: Individuals with PWS had more difficulty maintaining standing balance when relying on information from the somatosensory (C3), visual-vestibular (C4) and vestibular systems (C5, C6). A more stable walk was related to shorter steps, slower velocity and reduced peak quadriceps torque. Participation in multisensory activities that require appropriate prioritization of sensory system(s) input for controlling balance in altered sensory environments should be routinely included. In addition, exercises targeting muscular force and power should be included as part of exercise programming in PWS.

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Conflict of interest statement

Declaration of Competing Interest The authors declare no conflict of interest with the information presented in this manuscript.