EFFECTS OF WHOLE-BODY VIBRATION ON SPASTICITY, BALANCE, & HAMSTRING FLEXIBILITY IN A CHILD WITH CEREBRAL PALSY: A CASE REPORT

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INTRODUCTION

Whole-body vibration (WBV) training delivers oscillatory motion vertically through the entire body when standing on the platform. Improvements in postural control and mobility have been found in preliminary studies in individuals with Parkinson's disease, multiple sclerosis, and the elderly, however limited research is available examining the effects of WBV on cerebral palsy (CP) populations. Spasticity is a major impairment in CP that can interfere with postural control and gait [1]. Given that treatments are not effective among all individuals and outcomes are difficult to predict, the demand for strong alternative rehabilitation strategies continues. The specific aim of this study was to determine if a 6-week WBV training program would reduce spasticity, improve balance, and increase hamstring flexibility in a child with spastic CP.

METHODS

Our participant was a ten-year old boy with spastic hemiplegia CP affecting his right side (height 137.2 cm; weight 33 kg). Spasticity, hamstring flexibility, and postural control were observed before starting WBV training and 24 hours after the last session. The participant was exposed to 10 minutes of WBV (Power Plate®) three times a week for 6 weeks. The Modified Ashworth Scale (MAS) was used to measure spasticity. A goniometer was used to measure hamstring flexibility with the subject supine on an examination table. A Bertec forceplate was used to collect static balance trials. Ground reaction forces were recorded (40Hz) and the location of the center of pressure (CoP) was averaged over 3 trials. A custom Quick Basic program used the CoP locations to calculate the CoP measures.

RESULTS AND DISCUSSION

Bilateral upper extremity reflexes were normal, right patellar and Achilles reflexes remained hyperactive at post-testing compared to the left side (3+). Scores for the MAS revealed no increase in muscle tone (0) in the upper extremity except for the right elbow flexors (1) at pre-testing. Right hip flexor (1), knee extensor (2), and ankle dorsiflexor (2) muscle groups offered minimal resistance. Post intervention, tone decreased in the right hip flexor (0) and knee extensor (1). Left and right hip flexion angles passively measured at pre-test were 69º and 70º, respectively and increased to 75º for both the left and right side at post-testing. Increased CoP path lengths and sway area were observed (Table 1). Although postural control did not improve, one hypothesis to account for decreased control may be the increased degrees of freedom introduced as a result of the introduction of WBV.

SUMMARY/CONCLUSIONS

This data suggests 1) hamstring flexibility improved and 2) lower extremity tone decreased as a result of 6 weeks of WBV intervention.

REFERENCES

[1] Woollacott, M.H., (1998). Neurosci Biobehav Rev. 22(4): 583-589.

Table 1: Average balance measures during narrow and tandem stances.

	Pre-Test					Post-Test				
	PL (m)	PL vel (m/s)	A/P length (m)	M/L length (m)	Sway Area (cm^2)	PL (m)	PL vel (m/s)	A/P length (m)	M/L length (m)	Sway Area (cm^2)
Narrow	3.131	0.347	0.040	0.057	23.565	2.904	0.383	0.066	0.074	49.125
Tandem	3.237	0.359	0.047	0.050	24.467	3.130	0.391	0.074	0.051	40.790