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The Effect of Virtual Reality Intervention on the Balance control of Children with Developmental Coordination Disorder â€“ A Pilot Study

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Introduction

Children with Developmental Coordination Disorder (DCD) have a deficit in sensory organization and may experience difficulty in balance and postural control, which may further lead to increased risk of fall and difficulties in learning new motor tasks. Recent studies have suggested virtual reality training can improve balance ability in different medical conditions, but its effect on balance control of children with DCD has yet to be evaluated.

Objectives

The aims of this pilot study were to evaluate the effect of virtual reality game training on the balance control of children with DCD, and to further evaluate its effect on different composite of sensory organization of balance control.

Methodology

Children with gross motor problem/ DCD were recruited and divided into virtual reality training group (VR) and control group. Children in the VR group participated in 30-minute Kinect training twice per week for six weeks while the subjects in control group received no intervention. A conventional exercise class would be arranged to all subjects after this study. Functional balance was measured by the standard score in balance domain of Movement Assessment Battery for Children â€“ Second Edition (MABC-2), while the static balance was represented by the composite equilibrium score obtained from Sensory Organization Test (SOT) of Balance Master. Furthermore, the utilization of different sensory systems (visual, proprioceptive, vestibular) in maintaining balance was represented by the sensory ratios which were

also obtained from SOT. The changes of the means in the outcome measures between two groups were compared using independent t-test (for normally distributed means) or Mann-Whitney U test (for not normally distributed means).

Result

A total of 11 children were recruited. The VR group consisted of 6 subjects (mean age = 8, SD= Â± 2.10) while the control group consisted of 5 subjects (mean age = 7, SD = Â± 1.00). The demographics data between two groups showed no significant difference. After six weeks, the VR group showed a mean increase of 2.83 Â± 1.60 in the standard score of the balance domain in MABC-2 while that of control group showed no improvement (-0.20 Â± 2.59). The change of means between two group was statistically significant (p = 0.04). Furthermore, the authors of MABC-2 suggested a smallest detectable difference of 2 standard score was required for representation of clinical relevance. Therefore, our result also showed there was clinical significance in using virtual reality game for balance training. For the composite equilibrium score and sensory ratios, however, there were no significant changes of means between two groups, but there were trends of larger improvement in visual and vestibular ratios in VR group than in control group. To conclude, this pilot study showed preliminary promising result in improving functional balance of children with DCD by virtual reality intervention, but its effects on static balance and the utilization of different sensory systems remained inconclusive.