Comparison of three different methods of Virtual Reality Based Therapy and its effect on balance and weight shifting ability of children with cerebral palsy.

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1. Introduction

Cerebral palsy (CP) describes a group of disorders of the development of movement and posture, causing activity limitation, that are attributed to non-progressive disturbances that occurred in the developing foetal or infant brain. Children with CP almost invariably have problems with weight shifting and balance, which are important determinants of gait. Virtual reality based therapy (VRBT) is a playful form of exercise in which the positive feedback and intensive practice can be systematically manipulated in various ways to improve the balance. Virtual reality-based therapy is one of the most innovative and promising recent developments in rehabilitation technology that can help the patient in a very innovative way. Virtual reality is the use of interactive simulations created with computer hardware and software to present users with opportunities to engage in environments that appear to be and feel similar to real world objects and events. Studies have shown the effectiveness of VR technologies in rehabilitation. VRBT could be performed in various positions and with use of various gadgets. The purpose of this study was to evaluate the effect of three different methods of VRBT in improving weight shifting and balance in children with CP.

2. Method

The study was a randomized controlled trial. 15 children with CP were selected and randomly assigned into three groups. All the children underwent single event multilevel surgeries for both lower limbs and were undergoing rehabilitation with a sequenced protocol based therapy. All the children received VRBT with help of Nintendo Wii. Wii has two programmed software Wii fit and Wii sports. Wii sports is used to play games like tennis where a remote control operated by the hand is used. Wii fit is used to play balance games like skiing where a balance board is used. Group 1 children received VRBT using Wii sports where no balance board was used. Group 2 children received VRBT using Wii fit where the child was made to stand on the balance board. Group 3 children received VRBT using Wii fit where the child was made to sit on the balance board.

The outcome measures included walking test and steadiness test to measure balance scale, stabilometry reading to measure COG and single leg standing test. Outcomes were measured before the training, at the end of 2 weeks, 4 weeks and 6 weeks.

3. Results

5 of the subjects were female and 10 were males. Mean age of the children were 9.12 years. All types of CP were found in all the groups. Mean balance scores obtained in walking test before intervention was 42% for group 1, 39% for group 2 and 27% for group 3 respectively. Mean balance scores obtained in walking test after intervention was 49% for group 1, 50% for group 2 and 31% for group 3 respectively. The data suggests that the three groups showed improved balance and associated locomotor recovery in both balance scale and stabilometry reading. Group 2 showed maximum improvements compared to group 1 and group 2. Improvements were maintained in all the groups over a period of 6 weeks.

4. Discussion

A 6-week VRBT program improved the balance in children with CP, especially in children who used Wii fit. The study concluded that VRBT training can be implemented in various forms in children with CP to improve their balance. These results have encouraged us to reinforce the VRBT with new exercises to improve balance in children with CP.
References


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