Real-Time Video Feedback Could Improve Effect of Core Stabilization Exercise in Stroke Patients

IOS Press BV

According to Study Published in Restorative Neurology and Neuroscience

About 80% of stroke survivors experience hemiparesis, which causes weakness or the inability to move one side of the body. Core stabilization exercise to improve postural stability and independent walking in chronic hemiparetic stroke patients could be enhanced by real-time video feedback, report researchers in Restorative Neurology and Neuroscience.

Stroke is the most common cause of permanent disability in adults. Stroke patients generally show muscle weakness of limbs and trunk on the affected side. Walking performance is often affected by muscle weakness, spasticity, contracture, pain, sensory and visual impairments, and postural instability. One of the main goals of stroke rehabilitation programs is to improve posture and help patients to walk independently and safely. Core stability exercise has been used with success in athletes and orthopedic patients with lower back pain and has also been reported to improve trunk stability in stroke patients, which is essential for balance and extremity use during daily functional activities and higher level tasks.

Researchers hypothesized that that the effects of core stabilization exercise in stroke patients could be enhanced by augmented, or real-time, video feedback. Augmented feedback can provide information to patients regarding their problems while they are performing functional activities by themselves because it contains information on the nature or quality of the movement during performance and includes identification of the correct and incorrect parts of the function activities.

“The augmented reality system provided by video feedback using a computer in a simulator is a powerful mode of augmented feedback. It is delivered to the patient online in a computer-aided instruction program. The system provides real-time feedback as well as a record of the entire performance. The patient can therefore detect errors directly and attempt to correct them on the next trial. However, there is little research on the effect of real-time feedback on postural stability in individuals with chronic hemiparetic stroke during the core stabilization exercises,” explains co-author Byoung-Hee Lee, PT, PhD, of the Department of Physical Therapy, College of Health Welfare, Sahmyook University, Republic of Korea.

This study examined the feasibility of real-time feedback on postural stability and gait performance during core stabilization exercise in 19 patients, who had been diagnosed with chronic hemiparetic stroke six months or more before the study. Importantly, core stabilization exercise minimizes the risks of falls and improves safety during training, critical considerations when working with stroke patients. All of the patients had sufficient cognitive ability to take part in the study and could

walk independently with or without a walking aid for at least 15 minutes.

Participants were randomly assigned to an experimental group or a control group. Both groups met three times per week for 30 minutes over six weeks. The participants in the experimental group were provided real-time feedback during core stabilization exercises (bed, wedge, and ball exercises), and those in the control group performed core stabilization exercises without real-time feedback. Balance and gait performance of all participants was assessed before and after the training.

Prior to the six-week period, the control group performed better than the experimental group, but by the end of the period both the gait velocity (walking speed) and stride length showed significantly greater improvement in the experimental group than in the control group. Both groups were also trained on a timed up and go (TUG) test. After training, TUG test improvement was significantly greater in the experimental group compared to the control group.

Lee points out that, “Despite the small number of patients studied, the results clearly demonstrated that real-time feedback enhanced the results achieved through core stabilization exercise training because patients gained a better understanding of the movements as they were performing them. This study represents a step forward in the development of clinical treatment programs that can contribute to recovery of function,” he concludes.

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