Perspective
Volume 10:02, 2023

International Journal of Neurorehabilitation

ISSN: 2376-0281 Open Access

A Meta-Analysis Comparing Virtual Reality with Transcranial Direct Current Stimulation for Stroke Rehabilitation of the Upper Extremities

Seong Hong*

Department of Internal Medicine, University of Inje, Gimhae, Seoul, Korea

Introduction

A cerebral vascular disease with a high rate of morbidity, disability, and death is stroke. According to a nearly 40-year study, stroke is now the second leading cause of death worldwide, and in several nations, it is the leading cause of death. Regardless of whether they make due, 80% of patients have fluctuating levels of neurological deficiencies all through their lives and the deficiency of high inability changed life years leaves patients enduring incredibly. In recent decades, stroke incidence has increased by 68%. Consequently, not just the counteraction and opportune treatment of stroke is critical, yet in addition post-stroke recovery [1].

Unilateral hemiparesis, characterized by dysfunction in the upper and lower extremities, is one of the most common signs of stroke. Consequently, restoration becomes dire and fundamental when forceful and successful treatment neglects to achieve. Increasingly more recovery approaches are being utilized for patients with post-stroke. People can experience the virtual world more realistically thanks to virtual reality (VR)'s ability to communicate with reality. At first, VR was utilized to improve the gaming experience. With the improvement of innovation, VR had the qualities of experiential learning, expanded criticism, observational learning, and objective situated, so it was empowering to see that some examination involved VR in the clinical business with good outcomes. On account of the furthest point, just 11.6% of the patients can recapture full capability at a half year post-stroke. Compared to traditional physical therapy, patients with upper extremity hemiplegia can benefit more easily from rehabilitation when it is combined with virtual reality. However, using virtual reality comes with some drawbacks [2].

Description

Cortical excitability can be manipulated with non-invasive brain stimulation. As a non-invasive brain stimulation, transcranial direct current stimulation, or tDCS, is gradually being used in clinical treatment because it is less expensive, easier to use, and safer. A meta-examination has exhibited that tDCS works on engine execution in patients recuperating from persistent stroke or gentle to direct stroke. Furthermore, Kim et al. discovered a stronger short-term corticospinal facilitation of tDCS with VR and the combined effect. Llorens, others also demonstrated that VR and tDCS were significantly more effective than conventional physical therapy alone. These preliminaries explored the likelihood that patients could accomplish a superior long haul guess by getting both painless mind feeling with tDCS and directed preparing with VR. A few articles recommended that furthest point capability in patients with stroke could help more from the blend of tDCS and VR contrasted with VR alone. However, until now, no study has systematically and specifically compared the efficacy of tDCS and VR together with VR alone for upper extremity training. Thusly, we direct this meta-examination and methodical survey to evaluate whether the mix of tDCS and VR is superior to VR alone [1].

The purpose of this article is to present the first comprehensive meta-analysis and systematic review comparing VR and tDCS for stroke patients' upper extremity rehabilitation. As a common disease, stroke significantly affects quality of life. Estimating the taking care of oneself and portability of patients with stroke decides the effect of the treatment on the personal satisfaction. Even though the BI is unable to assess patients' cognition, speech function, visual function, or pain, it is still a reliable and valid index. Intriguingly, there was a significant improvement in BI between tDCS combined with VR and VR alone. This implied that blend treatment worked on the personal satisfaction in patients with stroke better compared to VR alone. The quality of movement was used to score the FM-UE scale, which was commonly used to measure upper extremity impairment. This meta-examination uncovered that the blend of tDCS and VR didn't bring about better improvement in the FM-UE scale contrasted with VR alone [3].

The number of blocks that an affected upper extremity can grasp and release in a single minute can be used to evaluate upper extremity function in various subjects for BBT. We likewise didn't find indisputable proof that the blend treatment of tDCS and VR was better than the VR alone gathering. However, it was important to note that quantitative measures of upper extremity function showed a significant trend toward significance in both groups. This could be because all four RCTs in this meta-analysis had small sample sizes, with the largest RCT having only 40 participants. Positive outcomes may be observed if additional participants and the same trend can be observed in subsequent studies. The use of MAS is sufficient to evaluate the subject's upper extremity spasticity because excessive spasticity is thought to restrict movement. Since the mean and SD of the distinctions inside the VR alone gathering were zero in Viana's review, the general impact between the two gatherings after treatment couldn't be assessed. Nevertheless, there were also no significant differences between the RCTs. The aforementioned findings are explained by the fact that some studies suggested that recovery of limb function was not always associated with improvement of spasticity [4].

Stroke patients frequently experience motor impairment in their upper extremities, which can have a significant negative impact on the patient's daily life. The primary point of stroke treatment is to diminish mind harm as well as to work with the recuperation of the patient. Numerous researchers are looking into various novel approaches to neurorehabilitation to determine which is more effective or applicable to various populations. Upper extremity movement and function were improved through the use of constraint-induced movement therapy in stroke rehabilitation. According to a review of 45 studies, robot-assisted upper extremity training can improve upper extremity function, muscle strength, and quality of life without increasing risk. Thieme and co. found that increasing upper extremity motor function and decreasing pain could be achieved through mirror therapy, which involves giving the patient the impression that the affected extremity moved in the same manner as the unaffected extremity. The Fugl-Meyer scale and MAS scores were found to

***Address for Correspondence:** Seong Hong, Department of Internal Medicine, University of Inje, Gimhae, Seoul, Korea, E-mail: hongseong@gmail.com*

Received: 01 April, 2023, Manuscript No. ijn-23-96335; **Editor assigned:** 03 April, 2023, Pre QC No. P-96335; **Reviewed:** 15 April, 2023, QC No. Q-96335; **Revised:** 21 April, 2023, Manuscript No. R-96335; **Published:** 28 April, 2023, DOI: 10.37421/2376-0281.2023.10.518

be improved by neuromuscular electrical stimulation, and these improvements remained for six months [2].

VR and tDCS were the two neurorehabilitation techniques engaged with this meta-investigation. Thomson and co revealed that despite VR's ability to assist stroke patients in upper extremity training, the evidence could not conclude that VR was more advantageous at the time. VR could be used as an adjunct for stroke, cerebral palsy, Parkinson's disease, schizophrenia, anxiety, post-traumatic stress disorder, and other conditions. Transcranial direct current stimulation (tDCS) and transcranial magnetic stimulation (TMS) were two examples of noninvasive brain stimulation. The existing studies did not conclude that transcranial magnetic stimulation was beneficial for stroke patients. Nevertheless, tDCS was already being considered as a possibility for stroke rehabilitation of the upper extremitie. The excitability of the non-lesioned motor cortex was decreased by the cathodal electrode, whereas the excitability of the lesioned motor cortex was increased by the anodal electrode. tDCS improved the affected limb's motor function through this possible mechanism [3].

All in all, whether the joined treatment of tDCS and VR will make a synergistic difference? A rise in corticospinal facilitation may have facilitated the recovery of upper extremity motor function, according to a number of studies. Also, stroke disturbed the equilibrium of the reciprocal cerebral halves of the globe however actuated the brain adaptability simultaneously. Rebalancing the bilateral cerebral hemispheres was helped by VR-assisted rehabilitation, and neuroplasticity was helped by tDCS-assisted rehabilitation. Rezaee and co. By combining functional near-infrared spectroscopy with electroencephalography, it was discovered that the combination of tDCS and VR could activate the sensorimotor cortex and prefrontal cortex. Cerebral palsy, anxiety, post-traumatic stress disorder, neuropathic pain, and multiple sclerosis all benefit from using tDCS and VR as a treatment option [4].

A network meta-analysis has demonstrated that cathodal tDCS is the most effective treatment option among the various forms of tDCS and physical rehabilitation when it comes to improving capacity for the activities of daily living following a stroke. Ahmed et al. observed that in various electric neurostimulation, tDCS and transcranial vagus nerve stimulation were more effective. Subramanian et al. discovered that the combination of noninvasive brain stimulation and virtual reality is promising for subacute stroke. However, there was a wide range of stimulation, including transcranial direct current stimulation (tDCS) and repetitive transcranial magnetic stimulation. In addition, the participants were not all stroke patients; they also included healthy volunteers. However, the effectiveness of VR alone in conjunction with combination treatment for upper limb training in stroke patients has never been directly compared in a meta-analysis. For stroke patients, is the combination treatment necessary? Patients and clinicians alike require additional evidence. In the brief period of time following the stroke, there would be varying degrees of spontaneous rehabilitation. Each patient's spontaneous rehabilitation was very different [4].

This cycle was significant and worked with by different medications or restoration measures. We were also bothered by the delay in initiating rehabilitation measures. Kwakkel, others proposed that FM-UE scores in no less than about a month post-stroke were unequivocally connected with long haul forecast. The majority of the patients who participated in Yao et al.'s study were in the subacute phase and significantly improved in FM-UE following VR and tDCS treatmen. The other study did not reach the same conclusion because it only included patients with chronic stroke. Furthermore, the cathodal terminal was set over the hand region of the unaffected engine cortex in 3 RCTs, while the anodal terminal was set over the essential engine cortex of the impacted half of the globe in another RCT. Accordingly, the time window and excitement type for consolidated treatment should have been additionally characterized. This meta-analysis had several limitations. Right off the bat, the four included RCTs was completely single-focus and little examples, which prompted a decrease in the believability of the proof. Second, Lee et al.'s trials. and Yao and others were single-blind studies, which may introduce the possibility of bias, and the accuracy of the results may be affected by the bias of the patient or researcher. Thirdly, the inclusion criteria and treatment procedures of the various trials varied as well [5].

Conclusion

For stroke patients who require upper-extremity training, the treatment strategy of combining tDCS and VR is slightly superior to VR alone. It is linked to significantly improved quality of life in stroke patients. Regarding motor function and motor impairment in the upper extremity, VR alone is not superior to the combined treatment. Notwithstanding, the scores of the FM-UE scale and the BBT will generally increment. For combined therapy, the type of stimulation needs to be further defined. Multi-center studies involving more patients are required in the future. It is necessary to further define the precise window of time for tDCS and VR therapy.

References

1. Naghavi, Mohsen, Amanuel Alemu Abajobir, Cristiana Abbafati, and Kaja M. Abbas, et al. "Global, regional, and national age-sex specific mortality for 264 causes of death, 1980–2016: a systematic analysis for the Global Burden of Disease Study 2016." *Lancet* 390 (2017): 1151-1210.
2. Wu, Simiao, B. O. Wu, Ming Liu and Zhengming Chen, et al. "Stroke in China: Advances and challenges in epidemiology, prevention, and management." *Lancet Neurol* 18 (2019): 394-405.
3. Szelenberger, Rafał, Joanna Kostka, Joanna Saluk-Bijak and Elżbieta Miller. "Pharmacological interventions and rehabilitation approach for enhancing brain self-repair and stroke recovery." *Current Neuropharmacol* 18 (2020): 51-64.
4. Chen, Yuping, HsinChen D. Fanchiang and Ayanna Howard. "Effectiveness of virtual reality in children with cerebral palsy: A systematic review and meta-analysis of randomized controlled trials." *Phys Ther* 98 (2018): 63-77.
5. Thomson, Katie, Alex Pollock, Carol Bugge and Marian Brady. "Commercial gaming devices for stroke upper limb rehabilitation: A systematic review." *Int J Stroke* 9 (2014): 479-488.

How to cite this article: Hong, Seong. "A Meta-Analysis Comparing Virtual Reality with Transcranial Direct Current Stimulation for Stroke Rehabilitation of the Upper Extremities." *Int J Neurorehabilitation Eng* 10 (2023): 518.