Virtual reality game-based therapy for restoring postural and coordination abnormalities in patients with TBI

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**Background:** A traumatic brain injury (TBI) disrupts the central and executive mechanisms of motor coordination, involving abnormal postural control, arm(s) and postural (trunk and legs) interaction, difficulties with arms coupling, lack of agility, and movement precision. To address these issues, we developed the virtual reality (VR) therapy, which instead of regular exercises includes a series of immersive VR games and scenarios, delivered with low-cost equipment. The therapy replicates the conventional exercise and activity sequence recommended for restoring postural and coordination abnormalities after TBI, and can be delivered either in a supervised clinical setting or in a patient's home.

**Objective:** Therapy efficacy was tested in 15 participants with moderate manifestations of TBI-related postural and coordination deficits, in the framework of a phase II clinical trial. Therapy included 15 sessions, delivered in-clinic, each approximately 50–55 min in duration, scheduled 2–4 times a week over 5 consecutive weeks. Each participant was evaluated with a battery of clinical tests and movement performance parameters at baseline, immediately after the therapy; and 1 month after the completion of training.

**Results:** Upon completion of the therapy most participants improved their postural stability, gait, and upper extremity movements. The effects were maintained fully or partially over the retention interval. Safety criteria were established for practicing in home.

**Conclusion:** Results will be used to refine the current version of the therapy into a cost-effective, highly-accessible approach, which can be delivered remotely via telerehabilitation.