

Upper extremity rehabilitation using SMART Board system among patient with stroke.

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Objective

Virtual reality based rehabilitation has been increasingly used for upper limb recovery in stroke survivors. This study was designed to find out the clinical applicability of the newly developed virtual reality based rehabilitation system (RAPAEL Smart Board™; SB system) among stroke survivors. Thus, we examined the therapeutic effects of SB and role of diagnostic measurements as a pilot study.

Methods

The present study was a single-blinded, randomized controlled trial. The study included 26 stroke survivors who were randomized to a SB or a conventional intervention (CON) group. In one set of session, Patient in the SB group completed 30 min session using the RAPAEL Smart Board™ and additional 30min of standard occupation therapy. On the other hand, patient in CON group completed matched amount of conventional occupation therapy. Each patient received 20 set of sessions over 4 weeks. The primary outcome was the change in the Fugl-Meyer assessment (FM) scores, and the secondary outcomes were the changes in the Wolf motor function test (WMFT), active range of motion (AROM) of upper extremities, Brunnstrom stage, modified Barthel index, and Stroke Impact Scale scores. Also, correlation between data from SB and classical outcome measures were obtained. Assessments were performed at baseline (T0), immediately after the intervention (T1), and 1 month after the intervention (T2). Comparisons between two groups were performed using RM-ANOVA and $p < .05$ was used to indicate a significant difference.

Results

Among 26 randomized patients, 25 participants (12 in the SB, 13 in the CON group) completed 4 weeks of intervention. There were no significant differences in baseline characteristics between two groups. Both groups showed improvements in the FMA (FMA-total, FMA-prox, and FMA-dist), WMFT (WMFT-sum, WMFT-time), AROM (shoulder flexor, abductor, and external rotator), and modified Barthel index ($p < .05$). AROM in shoulder internal rotator showed significant improvement only in SB group. However, statistically significant time x group interaction was not seen in all the outcomes. The data from SB were found to be significantly related to upper extremity function such as FMA-total, FMA-prox score, and Brunnstrom stage ($p < .05$).

Conclusion

SB system combined with conventional occupation therapy showed similar effects on upper limb function compared to amount-matched conventional therapy. Also, SB system could take a role of upper limb function assessment tool.

Keywords

Stroke, Upper extremity, Virtual reality, Smart Board