# EFFECTS OF VIRTUAL REALITY BALANCE TRAINING ON POSTURAL STABILITY AND DUAL-TASK RESPONSES IN PATIENTS WITH PARKINSON'S DISEASE

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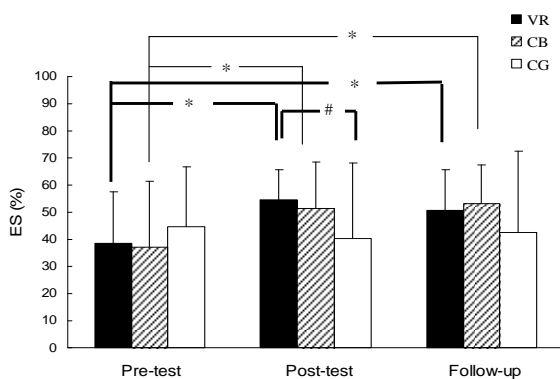
## INTRODUCTION

Postural instability is common in subjects with Parkinson's disease (PD) [1, 2]. The virtual reality (VR) training was used in stroke rehabilitation [3]. The purpose of this study was to investigate the short tem and long term effects of VR balance training on sensory, motor and cognitive domains of postural stability, while compared with physical therapy conventional balance (CB) training and untrained control group (CG).
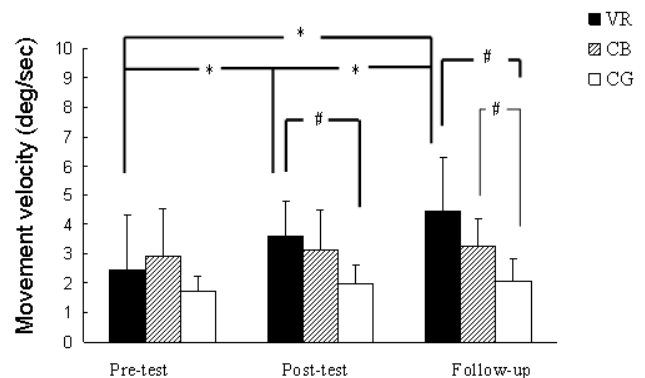
## METHODS

This was a single blind randomized control trial. Forty-two PD patients (age: 70.6±6.3y/o；Hoehn and Yahr Stage:2~3) were allocated into VR group (n=14), CB group(n=14) and CG group (n=14) by stratified randomization. Both training groups received 6 weeks intervention (2 sessions/week, 30 min/session) but the control group did not receive any kind of therapy. Each subject received assessments of postural stability before and after training period and at 4 weeks follow-up, including Sensory Organization test (SOT) with dual task paradigm and Limits of Stability test (LOS) by SMART balance master (Neurocom®). The 3-way mixed ANOVA (3 Groups x 3 Times x 2 Tasks) was used to test our hypotheses with intention to treat analysis.

## RESULTS AND DISCUSSION

VR and CB training significantly increased equilibrium score (ES) of SOT 6 either in single or dual task condition, and the improvements tended to be maintained for at least 4 weeks (Figure 1). However, only VR had significant difference with control group after training.



**Figure 2**: Movement velocity of LOS test in forward direction. VR, virtual reality; CB, conventional balance; CG, control group. 3 Groups x 3 Times (Forward: $p = 0.003$). #: between Group, $p < 0.05/3$. *: within group, comparison between Times, $p < 0.05/3$.

VR training significantly enhanced movement velocity (MVL) in forward direction. The MVL was increased continuously during 4 weeks follow-up (Figure 2). However, only VR had significant difference with control group just after training.

## CONCLUSIONS

VR training could improve sensory and motor control of static and dynamic balances. The training effect of either single or dual task on postural stability could be maintained after VR training. Therefore, we suggested VR balance training could be added into conventional rehabilitation programs to improve postural stability in PD patients.

**Figure 1:** Equilibrium score of SOT 6 for three groups (Mean ± SD). Three-way ANOVA: 3 Groups x 3 Times x 2 Tasks ($p> 0.05$); 3 Groups x 3 Times (SOT 6: $p = 0.023$). #: between Groups, $p < 0.05/3$; *: within group comparison between Times, $p < 0.05/3$.

## REFERENCES

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3. Jang SH, et al., *Arch Phys Med Rehabil* **86**:2218-2223, 2005.