



Ana Ventura¹, Joana Mendes¹; Renata Caldeira¹, Sofia Pinto^{1,2}, Ângela Maria Pereira^{1, 2, 3}

¹Physiotherapy, Escola Superior de Saúde Egas Moniz, ²Hospital Garcia de Orta; ³Centro de investigação interdisciplinar Egas Moniz, Almada, Portugal

Background

Impaired balance is a major cause of locomotor disability after stroke (1), and is one of the main objectives of the Physiotherapy programs. According to some studies, these individuals present alterations in posture, poor alignment of the head and trunk, asymmetry in weight distribution on the lower limbs, and increased postural sway (2). Recent advances in technology have resulted in numerous force platform systems with biofeedback, which can be used to retrain balance after a stroke (3). This method involves constant self-correction by visual biofeedback, in which motor planning and motor control skills are continuously stimulated, contributing to neural plasticity (4).

Objective

The main goal of this case study was to analyse if a balance exercise program with visual biofeedback had any benefit in post-stroke patient.

Methods

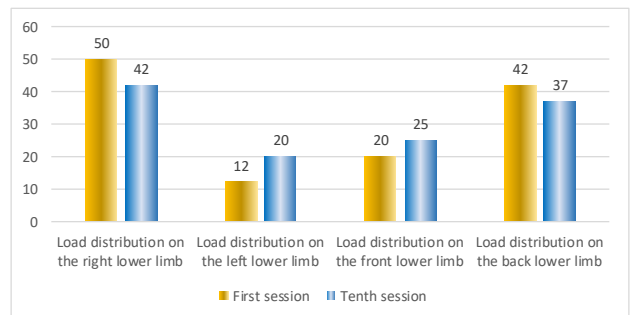
Woman, 54 year old with ischemic stroke on the vertebrobasilar territory of the right hemisphere with one month post-stroke. The subject completed 4 weeks balance therapy program 3 days per week. Each session consisted on 30 minutes of conventional therapy and additional 20 minutes of exercises in platform Physiosensing®. The Exercises on the Physiosensing platform included exercises in keeping symmetrical mass center in the sagittal plane, frontal plane, in both planes simultaneously, and dynamic balancing exercises, which consisted in the displacement of the center of mass in multiple directions simultaneously (movements in circle, square shape and labyrinth paths). The balance was assessed by the Berg Balance Scale (BBS), postural control was assessed by Postural Assessment Scale for Stroke (PASS) and the weight and the execution time of the exercises were assessed with the platform.

The subject was assessed at the beginning and end of sessions. The study was approved by the Ethics Committee of the Garcia de Orta Hospital and the patient gave her informed consent to participating in the investigation.

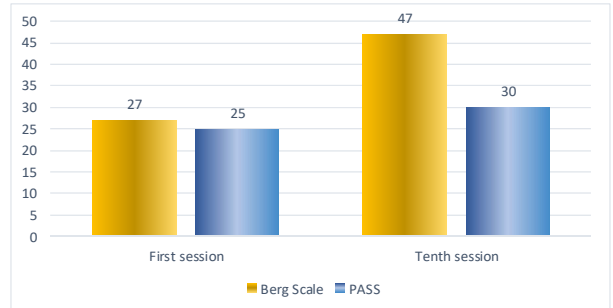
Results

The result indicated that subject improved on both scales. The subject improved on the Berg scale 20 points (27 to 47 points) and on the PASS scale 5 points (25 to 30 points). Moreover, the subject improved in symmetry load distribution at the frontal and sagittal plane and showed a decrease in the execution time of the exercises (1,24 seconds to 62 seconds). However, the total weight of the subject is 62 kg so, in order to present a correct distribution of the load it must present 31 kg in which limb.

Graphic 1 - Symmetry load distribution at the frontal and sagittal plane, in the beginning and in the end.



Graphic 2 – Results of the Berg Balance Scale and Postural Assessment Scale for Stroke Patients in the first and last session.



Conclusions

This pilot study suggested that an exercise program of balance with visual biofeedback may be useful as a complement to physical therapy after stroke in the vertebrobasilar artery, one month post-stroke, with improvements of dynamic balance, postural control and symmetrical distribution of load in the lower limbs.

References:

- Srivastava A, Taly A, Gupta A, Kumar S and Murali T. Post-stroke balance training: Role of force platform with visual feedback technique. *Journal of the Neurological Sciences*. 2009;287, p. 89-93.
- Karatas M, Cetin N, Bayramoglu M and Dilek A. Trunk muscle strength in relation to balance and functional disability in unihemispheric stroke patients. *American Journal of Physical Medicine & Rehabilitation / Association of Academic Physiatrists*, 2004; Vol.83, nº2, p. 81–87.
- De Nunzio AM, Zucchella C, Spicciato F, Tortola P, Vecchione C, Pierelli F, et al. Biofeedback rehabilitation of posture and weight bearing distribution in stroke: a center of foot pressure analysis. *Functional Neurology*, 2014; Vol.29, nº2, p.127-134.
- Cho SH, Shin HK, Kwon YH, Lee MY, Lee YH, Lee CH, et al. Cortical activation changes induced by visual biofeedback tracking training in chronic stroke patients. *NeuroRehabilitation*. 2007;22(2):77-84.

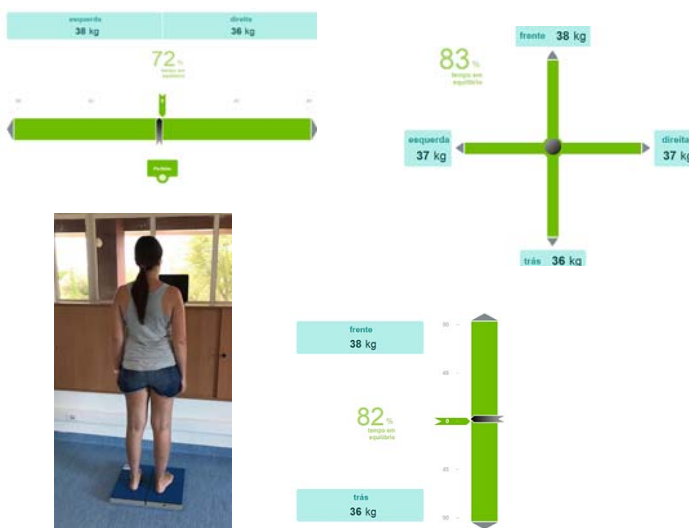


Figure 1 - Exercises on the Plataforma Physiosensing