The development of a portable balance platform for re-education postural stability in older adults

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INTRODUCTION

Falls in elderly are the leading cause of injury. A fall can result in serious injuries leading to loss of independence, hospitalization, increased medical costs, and a greater economic burden[1]. Therefore, the development and implementation of effective strategies to prevent falls in elderly is a vital challenge for the health society.

RATIONALE

Falls preventions classes based on the Otago program involve strength and balance exercises and they have been widely adopted due to their cost efficacy and evidence of effectiveness[2]. However, a recent Cochrane review revealed the lack of strong evidence of benefit for these techniques on improving balance ability. A meta-analysis for determining the effect of exercises in older adults recommended that a high dose of challenging balance exercises (> 50 hours) would have greater relative effects in falls[3]. Therefore, the aim of this research is the development of a new supplementary intervention for balance training of the people at risk of falling, using virtual reality environment which will motivate and engage the user. It is true that with the development of the virtual reality technology, rehabilitation became more attractive and entertaining for people. Virtual reality technology contributes to impaired motor control recovery and it is safe for elderly people[4]. On the other hand, wobble boards are predominantly used for balance and ankle proprioception training in younger adults however there evidence that they might also improve motor function[5].

DESIGN/METHOD

A low cost portable balance training platform using virtual reality environment has been developed for training older adults. The tool consist of an inertial sensor embedded in a balance board and connected with a visualization screen. This device allows a user to accurately calculate and exploit a real time visual feedback of the position of the platform. It will also be used in combination with more dynamic tasks, such as squats and upper limbs movements.

REFERENCES

[1] Berry, Sarah D. and Ram R. Miller. "Falls: Epidemiology, Pathophysiology, And Relationship To Fracture". *Current Osteoporosis Reports* 6.4 (2008): 149-154. Web

[2] Robertson M. Clare et al. "Preventing Injuries In Older People By Preventing Falls: A Meta-Analysis Of Individual-Level Data". *Journal of the American Geriatrics Society* 50.5 (2002): 905-911. Web

[3] Sherrington, C. et al. (2008). Effective exercise for the prevention of falls: a systematic review and meta-analysis. *Journal of the American Geriatrics Society*, 56(12), pp. 2234-43

[4] Gyeong Hee, Gak Hwangbo, and Hyung Soo Shin. "The Effects Of Virtual Reality-Based Balance Training On Balance Of The Elderly". *J Phys Ther Sci* 26.4 (2014): 615-617. Web.

[5] Waddington, Gordon S. and Roger D. Adams. "The Effect Of A 5-Week Wobble-Board Exercise Intervention On Ability To Discriminate Different Degrees Of Ankle Inversion, Barefoot And Wearing Shoes: A Study In Healthy Elderly*". Journal of the American Geriatrics Society* 52.4 (2004): 573-576. Web.