Notice of the Final Oral Examination
for the Degree of Master of Science

of

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BSc (University of Victoria, 2016)

“Pilot study for efficacy of Yuishinkai karate training community “dose” to improve balance and neuromuscular function in older adults”

School of Exercise Science, Physical and Health Education

Tuesday, January 19, 2021
1:00pm (PST)
Remote Defence

Supervisory Committee:
Dr. E. Paul Zehr, School of Exercise Science, Physical and Health Education, University of Victoria (Supervisor)
Dr. Olav Krigolson, School of Exercise Science, Physical and Health Education, UVic (Member)

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Dr. Phalguni Mukhopadhyaya, Department of Civil Engineering, UVic

Dr. Stephen V. Evans, Acting Dean, Faculty of Graduate Studies
Abstract

Purpose: To pilot test the efficacy of a documented 5-week karate training intervention for rehabilitation and neuroprotection in older adults.

Methods: eleven older adults (4 male, 7 female, age 59-90y; 168.4±5.8cm; 67.2±10.7kg), five older adults (4 male, 1 female, age 67-76y;176.8±6.4 cm; 69.9±17.6kg) with chronic conditions, and two young adults (2 female, age 23; 165.1±4.9cm; 60.1±6.7 kg) participated. A commercial balance board was used to assess balance through dynamic posture. Arm and leg strength, Timed Up and Go (TUG), and spinal cord excitability (via the soleus H-reflex) were assessed.

Results: Over the intervention participants completed approximately 2437 steps, 1762 turns, 3585 stance changes, 2047 punches, 2757 blocks, and 1253 strikes. Dynamic postural performance improved after the intervention (tTarget(18%, p=0.128), tCenter (9%, p<0.01), and tTotal (14%, p=0.073)), with 9 participants showing improvements in balance. No significant changes were found in TUG group data (p=0.539) but 5 neurologically intact participants (4-9%; p<0.05) and 1 Parkinson’s Disease participant (3%, p<0.05) improved. There was significant improvement to strength in the left hand (2%, p=0.037) and right leg (40%, p=0.050).

Spinal cord excitability remained unchanged across the group a but 5 (3 neurologically intact (195%, 215%, 48% (avg= 153%); p<0.05); Parkinson’s Disease participants (19%, 23%; p<0.05)) had significantly modulated H-reflex amplitudes following the intervention.

Conclusion: Five weeks of training caused improvements in balance reactions and strength suggesting that neuromechanical integrity improved. The whole-body training embodied in martial arts enhanced neuromuscular function and postural integration. The observations of this pilot investigation provide quantitative groundwork for explorations of dose and development of martial arts interventions as functional fitness intervention for older adults.

Keywords: Balance; Hoffmann reflex; Spinal cord excitability; Martial arts; Rehabilitation; Aging