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Thai Yoga improves physical function and well-being in older adults: A randomised controlled trial

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ABSTRACT

Objectives: Compare two 12-week low-intensity exercise regimens on components of physical function and quality of life in community-dwelling healthy yet sedentary adults aged over 60.
Design: This study used a randomised, multi-arm, controlled trial design.
Methods: Thirty-nine sedentary participants (29 women), aged 67.7 ± 6.7 years were randomly allocated to either a 12-week Thai Yoga (**TY**) or Tai Chi (**TC**) for 90 min twice per week, or telephone counselling Control (**C**). A Senior Fitness Test (chair-stand, arm-curl, sit-&-reach, back-scratch, 8-foot up-&-go and 6-min walk) and Short-Form 36 Health Survey, Centre for Epidemiological Studies of Depression, Physical Activity Scale for the Elderly and the Physical Activity Enjoyment Scale were assessed at baseline, six, 12 weeks, and three months after the completion of the regimen.
Results: After 12 weeks, chair-stand (mean difference, 2.69; 95% CI, 0.97–4.41; P < 0.001), arm-curl (2.23; 95% CI, 0.06–4.52; P = 0.009), sit-&-reach (1.25; 95% CI, 0.03–2.53; P = 0.013), back-scratch (2.00; 95% CI, 0.44–3.56; P = 0.005), 8-foot up-&-go (−0.43; 95% CI, −0.85 to 0.01; P = 0.013), 6-min walk (57.5; 95% CI, 20.93–94.07; P < 0.001), vitality (13.27; 95% CI, 2.88–23.66; P = 0.050) and enjoyment (7.96; 95% CI, 3.70–12.23; P = 0.001) significantly improved in **TY** compared to **C**, however no change was observed in **TC** compared to **C**. **TY** improved in chair-stand (2.31; 95% CI, 0.59–4.03; P = 0.007), sit-&-reach (1.38; 95% CI, 0.10–2.66; P = 0.007), 6-min walk (32.31; 95% CI, −4.26–68.88; P = 0.015), vitality (12.88; 95% CI, 2.50–23.27; P = 0.040) and enjoyment (5.65; 95% CI, 1.39–9.92; P = 0.010) compared to **TC** after 12 weeks.
Conclusions: The findings suggest that older adults can make significant improvements in their health and well-being by engaging in low intensity Thai Yoga exercise.

1. Introduction

Lifelong physical inactivity is associated with increased mortality and risk of chronic disease, reduced quality of life, early onset of physical frailty and declining function.[1] Such effects of sedentary living impose a considerable burden on society, with older adults being the most physically inactive of any age group.[2] In contrast, the introduction of physical activity has been shown to ameliorate many of the effects of secondary ageing.[3] Therefore, it is recommended that all healthy older adults participate in a minimum of 30 minutes of moderate-intensity aerobic physical activity 5 days per week and resistance exercise regimens twice weekly.[3] However, less than 14% and 9% of older adults over the age of 65 and 75 years respectively are currently meeting these standards.[4]

Clearly many older adults have difficulty in meeting these minimum recommended levels of physical activity, yet evidence suggests significant health benefits are still afforded to older individuals when participating in significantly lower levels of physical activity than recommended.[5,6] Furthermore, low intensity physical activity is associated with maintenance of physical fitness[7] and enhanced well-being in older adults.[8] Given the linkages between recommended physical activity and health benefits gained from low-intensity physical activity, we sought to investigate the effects of two forms of structured low-intensity exercise that have an emphasis on range of motion and balance; Tai Chi and Thai Yoga.

Tai Chi originated in China as a martial art and the practice of this form is associated with a low metabolic load[9] and significant health benefits.[11–13] While, Tai Chi has been shown to afford participants with significant physiological benefits[9,10] such as; improved car-

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diorespiratory capacity,[11] strength, balance,[11–13] flexibility,[7,11,12] and quality of life[7,11]; Thai Yoga has received considerably less scientific attention.

Thai Yoga is a traditional form of exercise practiced extensively in Thailand for many centuries.[14] It includes a low-impact, low- to moderate-intensity range of motion incorporating elements of muscle-strength, balance, flexibility, and body alignment. It also combines meditation with slow, gentle, graceful movements, as well as deep breathing and relaxation.[14] The main principles and techniques of Thai Yoga are similar to the hatha style, both yoga styles are classified as low-intensity exercise.[15,16] However, Thai Yoga differs from hatha yoga in that it is less strenuous with postures that are reported to be less challenging and therefore easier to perform than those of hatha yoga.[14] Thus, the practice of this form of yoga may be more accessible to older sedentary cohorts. However, clear evidence from a randomised controlled investigation on the effectiveness of Thai Yoga currently does not exist.

Furthermore, it is common for scientific investigations to focus exclusively upon the treatment phase of experimental regimens.[13,17] In contrast, significantly less evidence exists about the sustainability of physical gains made when formal experimental treatments are withdrawn. This is a critical consideration for older cohorts that have significantly lower levels of engagement in physical activity, yet are likely to yield the greatest relative physical gains from participation in exercise regimens.[2]

Therefore, this investigation sought to determine the effect of two 12-week low-intensity exercise regimens on components of physical function relevant to activities of daily living and quality of life in community-dwelling healthy yet sedentary adults aged over 60.

2. Methods

Participants were recruited from several communities in the Illawarra region, NSW, Australia. Information about the study was mailed to older adults who had volunteered to participate in the study during our earlier study. All interested people received an information package with detailed information about the study. They were asked to complete a screening questionnaire, which included the Physical Activity Readiness Questionnaire (PARQ) and the Physical Activity Scale for the Elderly (PASE) to determine trial eligibility. A postage free envelope was included and reminders were sent after two weeks.

Individuals were considered eligible to participate in the study if they were aged over 60 years, apparently healthy as determined by the PARQ, participating in less than 150 min of moderate-to-vigorous physical activity per week as determined by the PASE. Thirty-nine volunteers (29 female) age 66.6 years (SD 6.7), mass 72.7 kg (SD 14.7), stature 1.62 m (SD 0.09), fulfilled the preliminary eligibility criteria and provided written informed consent.

This was an assessor-blinded, randomised controlled trial approved by the University of Wollongong Human Research Ethics Committee (HE10/392). Eligible subjects first completed baseline assessments and were then randomly allocated by researcher (H.G., blinded to subject recruitment and baseline assessment phases) using Graphpad QuickCalcs (http://www.graphpad.com/quickcalcs/randMenu/, GraphPad Software, La Jolla California USA). Subjects were allocated in triplet (three participants) blocks to one of two low-intensity exercise groups (Thai Yoga or Tai Chi) or a Control group. Participants then completed either a 12-week low-intensity exercise regimen, twice weekly or received information on exercise. All participants were reassessed at Week 6 and Week 12 and then 3 months after the completion of the regimen (Week 24). All components of the investigation were undertaken at the Illawarra Health and Medical Research Institute, University of Wollongong

The Thai Yoga (**TY**) intervention employed a modified, 80 min, 15-posture **TY** routine (30) taught by a qualified instructor (see Supplementary Fig. S1A–C in the online version at doi:10.1016/j.jsams.2016.10.007). Each session began with a 15-min warm-up consisting of diaphragmatic breathing and meditation in a seated position, followed by stretching exercise in a standing position. The 15-posture routine then commenced and involved six seated postures, six standing postures and three final postures All postures within the **TY** routine were held for a maximum of 20 s and repeated 3–5 times. Each class ended with 10 min of supine and standing relaxation.

A 12-movement Sun style Tai Chi (**TC**, see Supplementary Fig. S1D–O in the online version at doi:10.1016/j.jsams.2016.10.007) program suitable for older adults was implemented by a qualified instructor.[17] Participants were expected to stand upright and adapt each movement according to their individual capability. One set of the basic and advanced movements took about approximately two minutes, and 10–15 sets of these movements were performed in each session. A session consisted of a 10-min warm-up, 60 min of **TC** and a 10-min cool down.

Participants in **TC** and **TY** were also encouraged to complete unsupervised home-based training for 20 min on alternate days to the 12-week intervention. Following this 12-week period subjects were encouraged to continue their unsupervised home sessions, using an instructional DVD or attend community-based classes up to Week 24 of the investigation. Subjects recorded the frequency and duration of self-practice in a daily activity log.

Participants in the Control group (**C**) received telephone-supervised exercise regimen advice that encouraged increased home-based physical activity. All participants attended a face-to-face meeting and were provided with written information to facilitate exercise. Weekly telephone counselling sessions for the first four weeks, then fortnightly phone contact for the remainder of the investigation were provided.

In summary, all participants were assessed at four time points; Baseline, midway (Week 6), completion of the exercise regimen (Week 12) and 12 weeks after the end of the exercise regimen (Week 24) using the Senior Fitness Test battery[18] and four validated questionnaires to assess quality of life.

The Senior Fitness Test consists of six assessments of physical performance required for daily living.[18] The assessment battery comprises of assessments of power and strength, 30-s chair-stand and arm-curl; range of motion, chair sit-&-reach and back-scratch; agility and dynamic balance, 8-foot up-&-go and endurance, 6-min walk test. Each test was conducted individually, with the exception of the 6-min walk, which was conducted in small groups of four participants who were staggered 10-s apart and walked at their own pace. Research assistants were blinded to participant experimental groupings.

Participants also completed four validated self-report questionnaires. Physical activity for a 7-day period was assessed using the Physical Activity Scale for the Elderly (PASE)[19] and enjoyment in the activity was evaluated using the Physical Activity Enjoyment Scale (PACES).[20] A Short-Form Health Survey (SF-36) was completed to determine physical and mental health outcomes[21] and symptoms associated with depression were assessed using the Center for Epidemiological Studies of Depression (CES-D) questionnaire.[22]

A sample size of 13 subjects per group was required for a power of 0.80 to detect a difference between means of three with an alpha of 0.05.[13] Data were analysed on an intention-to-treat basis. Baseline group mean comparisons were performed using one-way analyses of variance *(ANOVA)* with post hoc analysis to determine group differences. Repeated-measures *ANOVA* procedures were conducted for each instrument, contingent on the multivariate *ANOVA* reaching statistical significance (*ANOVA*, Wilk's criterion). Bonferroni post hoc analyses were used to determine group differ-

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