The Effects of Brisk Marching on Anthropometry, Functional Exercise Capacity and Physical Performance among Elderly Women

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Background and Objective: Elderly people, in general, demonstrate decreases in functional exercise capacity and physical performance. It has been established that aerobic exercise help provide health benefits in every age group including elderly people. The present study investigated the changes in anthropometry, functional exercise capacity and physical performance as a consequence of brisk marching training in elderly Thai women.

Methods: It was carried out in 41 subjects with no history of neuromuscular or cardiopulmonary or metabolic disorders aged between 55 to 76 years. They were divided into two groups: control group (C, n=20), and exercise group (E, n=21) engaging to brisk marching at 79.71 ±3.05% of HRmax, 30 min/session, 4.83 ±0.40 sessions/week for 12 consecutive weeks.

Results: Brisk marching training significantly (p<0.05) reduced body weight (1.8%), body mass index (BMI) (1.7%), waist (4.0%) and hip circumferences (3.4%), waist to hip ratio (WHR) (1.1%) and %total body fat (3.5%). Moreover, back and leg strength, trunk flexibility representing physical performance and distance of a 6MWT representing functional exercise capacity were significantly increased by 5.4%, 12.6%, 14.2% and 11.0 % respectively (p<0.05) after training.

Conclusion: This study demonstrated that brisk marching at moderate intensity improvements in functional exercise capacity, physical performance and anthropometric variables. Therefore, regular exercise should be recommended to the elderly in order to decrease risks of health deterioration.

Key words: brisk marching, functional exercise capacity, physical performance, elderly
minutes or more a day or two or more days a week. Their results suggest that increasing the number of steps walked daily improves physical fitness. Moreover, regular exercise can improve the cardiovascular status: reduces the risk of cardiac disease, high blood pressure, cerebrovascular disease, body weight and prevents obesity and diabetes mellitus. Recently, it has been shown that respiratory muscle strength, pulmonary function, e.g. vital capacity, inspiratory reserve volume and inspiratory capacity, physical performance and cardiovascular endurance and modification of cardiac autonomic control are enhanced by brisk marching in sedentary Thais. Unfortunately, there have been no studies regarding the effects of brisk marching on functional exercise capacity and physical performance among the elderly Thai.

**Objectives**

The objective of this study was designed to investigate such effects of brisk marching with moderate intensity for 12 consecutive weeks in the elderly Thai.

**Materials and Methods**

**Study design and population**

The study was analytical and descriptive approved by the Human Research Ethics Committee, Khon Kaen University. Each participant was informed of the purpose of the study and provided written informed consent. Forty-one elderly women aged between 55-76 years were recruited. All subjects were completed a confidential health-screening questionnaires. They were healthy with BMI of 18.5–24.9 kg/m² with no history of cardiovascular (i.e. coronary heart disease, arrhythmia and chronic heart failure), neuromuscular, arthritic, pulmonary, severe microvascular diseases, diabetes mellitus, hypertension or other debilitating diseases.

**Anthropometry measurement**

Height and weight were measured according to the WHO guidelines. WC and HC were used to calculate waist to hip ratio (WHR) based on the World Health Organization (WHO) Guidelines 2012.

**Functional exercise capacity**

The distance of six-minute walk test (6MWT) was measured based on American Thoracic Society (ATS) Statement Guidelines for the six-minute walk test.

**Physical performance**

Muscle strength was determined by a back and leg dynamometer (Takei Physical Fitness Test, Back-A) whereas flexibility was determined by a trunk flexibility sit-and-reach box.

**Experimental protocols**

All participants were divided into two groups: control (C, n=20) and exercise groups (E, n=21). Both groups engaged to a run in period by walking 40-60 min/day for 2 weeks. Only the E group performed brisk marching exercise (5 min warm-up, 20 min of 79.71±3.05% HRmax and 5 min cool-down), 3 to 5 days/week for 12 consecutive weeks.

**Statistical analysis**

Data were expressed as means ± SD. The Stata 10 Statistical software was used to perform the statistical analysis. Unpaired t-test was used to compare differences in characteristics and all parameters between the C and E groups. Two-sample Wilcoxon rank-sum (Mann-Whitney) test was used when data deviate from normality. A value of p<0.05 was taken to be the threshold of statistical significance.

**Results**

As shown in Table 1, before training the anthropometric variables in the C were similar to those of the E groups. Interestingly, it was revealed that weight, BMI, WC, HC, WHR and fat% were significantly lower in post brisk marching exercise compared to pre-exercise by 1.8%, 1.7%, 4.0%, 3.4% and 1.1% and 3.5 (p<0.05), respectively (Table 1, Fig. 1). Furthermore, there were
no differences in those parameters when comparisons were made between the week 0 and week 12 in the C group.

Table 2 and Fig. 2 demonstrated significantly increases in distance of a 6MWT, back and leg strength and trunk flexibility by 11.0%, 5.4%, 12.6% and 14.2% (p<0.05), respectively, after 12 weeks of brisk marching in the E group but not in the C group.

**Discussion**

The important finding of this study is that brisk marching exercise at moderate intensity for over 12 weeks improves anthropometry, functional exercise capacity and physical performance in elderly Thai women. These
findings are in agreement with previous studies. Decreased fat mass following aerobic exercise at moderate-intensity has been reported. In 2006, it has been demonstrated that 30 minute walking-running training three days a week for 12 weeks causes a significant difference in BMI and BW between prior and 12 weeks after training. Similarly, training effects of 16 weeks of progressive aerobic moderate intensity and strength based training in older women and men resulted in significantly decreases in BW, WC and BMI. During exercise the energy source produced by aerobic and anaerobic systems mainly come from fat and glucose. Therefore, aerobic exercise is recommended for weight loss.

Table 2 Functional exercise capacity and physical performance assessed pre- and post- brisk marching training in control and exercise groups

<table>
<thead>
<tr>
<th></th>
<th>Control group (n=20)</th>
<th>Exercise group (n=21)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Pre-</td>
<td>Post-</td>
</tr>
<tr>
<td><strong>Distance of 6MWT (m)</strong></td>
<td>550.4±55.1</td>
<td>546.4±68.7</td>
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<tr>
<td><strong>Physical performance:</strong></td>
<td></td>
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<tr>
<td>Back (kg)</td>
<td>60.8±19.2</td>
<td>60.9±22.4</td>
</tr>
<tr>
<td>Leg (kg)</td>
<td>59.7±19.4</td>
<td>60.7±21.2</td>
</tr>
<tr>
<td>Trunk flexibility (cm)</td>
<td>17.3±6.8</td>
<td>16.7±7.8</td>
</tr>
</tbody>
</table>

6MWT, six-minute walk test. Data are mean ± SD tested by paired t-test. *p<0.05 pre- versus post-12 weeks

![Graph showing functional exercise capacity and physical performance pre- and post-brisk marching training in control and exercise groups.](image)

**Figure 2** Functional exercise capacity and physical performance assessed pre- and post- brisk marching training in control (n=20) and exercise (n=21) groups. Abbreviations are as in Table 2. *p<0.05 pre- versus post-twelve weeks.
carbohydrate (CHO), respectively. Previous studies demonstrated that exercise influences the metabolism by increasing CHO and fat oxidation rates.

A study in the elderly (50-60 y) who underwent a brisk walking program, 40 min 4 times weekly for 13 weeks at the intensity about 50% of HRR which is moderate intensity found a significant increase in leg strength in a one-leg squat. After the 2-month walking exercises program muscle strength improve in the elderly.

American College of Sports Medicine, they suggest that regular stretching exercise improves range of motion, although there is little effect observed acutely or immediately except as can be attributed to muscle-warming activities.

In addition, a study in 18 patients with severe chronic heart failure, mean age was 53 years; all subjects underwent three weeks of exercise training showed an increase in the maximum distance walked. Moreover, aerobic exercise training by brisk marching at moderate intensity increases the distance of the 6MWT among healthy sedentary Thais.

Conclusion

Twelve weeks of brisk marching exercise training at moderate intensity is a health benefit exercise as it improves anthropometry, functional exercise capacity and physical performance in elderly women.

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