“Baduanjin” healthy Qigong exercise reducing oxidative damage and bone loss in aged postmenopausal women

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Abstract
The aim of this study was to evaluate the effectiveness of “Baduanjin” healthy Qigong exercise on physiological index in aged postmenopausal women. After 8 months of exercise, significant increase in serum antioxidant enzymes activities was observed in aged postmenopausal women compared to the initial stage of exercise (0 month). “Baduanjin” healthy Qigong exercise significantly enhanced serum estrogen level and decreased FSH and LH levels. In addition, “Baduanjin” healthy Qigong exercise significantly decreased serum BGP, ALP and Ca in aged postmenopausal women. It can be concluded that “Baduanjin” healthy Qigong exercise was effective in decreasing oxidative stress and bone loss in aged postmenopausal women.

Key words: Postmenopausal women, “Baduanjin” healthy Qigong, estrogen.

Introduction
The Qigong is widely recognized in China as a type of physical exercise that has been practiced for thousands of years 1. The Qigong combines meditation, movement and breath control in one single practice 2. Its practice has several positive physiologic effects: (i) facilitates blood circulation, improving tissue oxygenation and stimulating the recovery of damaged tissues 3, 4; (ii) increases cardiac output, reduces peripheral resistance and may lower arterial blood pressure in hypertensive individuals 5, 6 and (iii) improves lipid profiles in hypertensive individuals 7.

Lack of estrogens after menopause results in decreased bone mass 8. Several clinical trials have shown the beneficial effect of hormone therapy (HT), estrogen therapy (ET), and estrogen plus a progesterone therapy (EPT) on bone mass loss in postmenopausal osteoporosis 9, although HT/ET/EPT is no longer recommended for the prevention of bone loss due to increased risk in breast cancer and cardiovascular diseases 10. Low levels of estrogen are common among menopausal women and further raise the risk of decrease in bone mineral density (BMD), osteoporosis, bone fractures and subsequent complications. Postmenopausal osteoporosis which is considered a public health issue threatening a large part of the population above 50 years of age, generally occurs asymptotically and, consequently, the afflicted individuals will only be diagnosed after the occurrence of fractures 11. Indeed, during menopausal bone loss, bone resorption activity mediated by osteoclasts outweighs bone regeneration by osteoblasts, resulting in an overall weakening of the bone, particularly the trabecular one, in typical sites as lumbar spine or femoral neck. Multiple factors may contribute to the pathogenesis of postmenopausal osteoporosis including environmental, lifestyle and genetic factors 12.

In the present study, we investigate the effect of “Baduanjin” healthy Qigong exercise on serum antioxidant index, estrogen and bone metabolism index in aged postmenopausal women.

Materials and Methods
Participants and exercise: Participants were recruited from the Guangzhou city in 2012. Participants were 32 postmenopausal women (mean age 56±4). They received heart rate, blood pressure, vital capacity and blood lipid measurement and were confirmed to be healthy. During 8 months of instruction, participants were asked to perform the “Baduanjin” healthy Qigong exercise for 80 min at morning every day. At the end of exercise, blood was taken from all participants for some biochemistry index analysis.

Biochemistry analysis: Blood antioxidant indexes were analysed using commercially available kits. Blood E2, P, FSH and LH levels were analysed using radioimmunoassay method. Blood BGP level was analysed with enzyme linked immunosorbent assay (ELISA) method. Blood ALP, Ca and P levels were analysed with semi-automatic biochemical analyzer.

Statistical analysis: Data were expressed as mean ± standard deviation (SD). The Duncan’s test and one-way analysis of variance (ANOVA) were used for multiple comparisons by the SPSS 13.0 software package. Difference was considered to be statistically significant if \( P < 0.05 \).
Results and Discussion

Regular physical activity and exercise are recommended not only for maintenance of optimal health and prevention or management of chronic diseases 13 but also to enhance or maintain antioxidant defenses 14. The study of Borras et al. 15 indicated that postmenopausal women have lost the protective antioxidant benefits of estrogen; a loss of ovarian hormones is associated with lower glutathione levels and increased peroxide formation in systemic tissues. Vina et al. 16 reported that different estrogen levels were responsible for a higher radical production in males than in females. Overweight and obesity are additional factors increasing oxidative stress 17.

After 6 months exercise, serum MDA level in aged postmenopausal women was significantly \( P < 0.01 \) decreased, whereas GSH level was significantly \( P < 0.01 \) increased compared to the initial stage of exercise (0 month) (Table 1).

Table 1. Effect of “Baduanjin” healthy Qigong exercise on serum MDA and GSH levels in aged postmenopausal women.

<table>
<thead>
<tr>
<th>Time (month)</th>
<th>MDA (ng·L (^{-1}))</th>
<th>GSH (mol·L (^{-1}))</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>7.12±0.63</td>
<td>106.31±9.05</td>
</tr>
<tr>
<td>8</td>
<td>4.28±0.33</td>
<td>285.19±17.48</td>
</tr>
</tbody>
</table>

\( P < 0.01, b P = 0.01, \) compared with 0 months.

Table 2 shows the effect of “Baduanjin” healthy Qigong exercise on serum antioxidant enzyme activities in aged postmenopausal women. After 6 months exercise, serum SOD, CAT, GSH-Px and GR levels in aged postmenopausal women were significantly \( P < 0.01 \) increased compared to the initial stage of exercise (0 month). In short, our study showed that 8 months of “Baduanjin” healthy Qigong exercise could enhance serum antioxidant enzyme activities and decrease oxidative stress in aged postmenopausal women.

Table 2. Effect of “Baduanjin” healthy Qigong exercise on serum antioxidant enzyme activities in aged postmenopausal women.

<table>
<thead>
<tr>
<th>Time (month)</th>
<th>SOD (µ·L (^{-1}))</th>
<th>CAT (µ·L (^{-1}))</th>
<th>GSH-Px (µ·L (^{-1}))</th>
<th>GR (mol·L (^{-1}))</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>79.07±4.44</td>
<td>27.04±1.66</td>
<td>31.88±1.93</td>
<td>57.21±4.09</td>
</tr>
<tr>
<td>8</td>
<td>198.52±13.27</td>
<td>51.48±3.08</td>
<td>83.09±6.58</td>
<td>72.45±5.38</td>
</tr>
</tbody>
</table>

\( P < 0.01, b P = 0.01, \) compared with 0 months.

For many years, deficiency in estrogen has been thought to be the major cause of osteoporosis in postmenopausal women 18-21, and estrogen has been used as the primary prevention against osteoporosis and for its treatment. The gonadotropic glycoproteins, follicle stimulating hormone (FSH) and luteinizing hormone (LH) are released by the pituitary gland and play a central part in the endocrine regulation of the ovarian processes during the menstrual (ovarian) cycle of the human female. Moreover, FSH rather than estrogen correlates best with bone turnover markers in postmenopausal women 22. Similarly, after hormone therapy, decreases in FSH correlate with gains in bone mass 23, 24. On the basis of these previous data, it may be suggested that hypogonadal bone loss is due to a possible pituitary determined mechanism.

The result of serum E2, P, FSH and LH levels in aged postmenopausal women is presented in Table 3. These results clearly indicate that “Baduanjin” healthy Qigong exercise resulted in a significant \( P < 0.01 \) increase in the level of serum E2 and P level and significant \( P < 0.01 \) decrease of serum FSH and LH as compared to control.

The result of serum BGP, ALP, Ca and P levels in aged postmenopausal women is presented in Table 4. These results clearly indicate that “Baduanjin” healthy Qigong exercise resulted in a significant \( P < 0.01 \) decrease of serum BGP, ALP, Ca levels but insignificant \( P > 0.01 \) increase of serum P as compared to control.

Conclusions

“Baduanjin” healthy Qigong exercise may promote body estrogen secretion and decrease high conversion of bone metabolism in serum. This causes a positive effect on preventing loss of bone mineral elements and development of osteoporosis in postmenopausal women.

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References


