

Yi Jin Jing (Sinew-transforming Qigong Exercises) for primary osteoporosis in the elderly: a clinical trial

易筋经锻炼治疗老年原发性骨质疏松症的临床试验

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Abstract

Objective: To observe the clinical efficacy of Yi Jin Jing (Sinew-transforming Qigong Exercises) for primary osteoporosis in the elderly.

Methods: Eighty old patients with primary osteoporosis were randomized into a Yi Jin Jing group and a medication group, 40 cases in each group. The Yi Jin Jing group was intervened by Yi Jin Jing (Sinew-transforming Qigong Exercises) training, while the medication group was intervened by oral administration of alendronate sodium tablet. Prior to and after 6-month intervention, the bone mineral density (BMD) of the proximal femur, visual analog scale (VAS) and activities of daily living (ADL) were estimated.

Results: There were no significant differences in the BMD of the proximal femur, and VAS and ADL scores between the two groups before the intervention ($P>0.05$). After 6-month intervention, the above items all improved significantly in both groups (both $P<0.01$); the improvements in VAS and ADL scores in Yi Jin Jing group were more significant than those in the medication group ($P<0.01$), while the between-group difference in the BMD of the proximal femur was statistically insignificant ($P>0.05$).

Conclusion: Practice of Yi Jin Jing (Sinew-transforming Qigong Exercises) can effectively ameliorate the BMD in the elderly with primary osteoporosis, and it can reduce the pain and improve ADL, with a better general effect compared to oral administration of alendronate sodium tablet.

Keywords: Yi Jin Jing; Physical and Breathing Exercises; Exercise; Osteoporosis; Bone Density; Pain; Activities of Daily Living; Aged

【摘要】目的: 观察易筋经治疗老年原发性骨质疏松症的临床疗效。**方法:** 选取老年原发性骨质疏松症患者80例, 将其按随机数字表法随机分为易筋经组及药物组, 每组40例。易筋经组进行易筋经锻炼, 药物组口服阿仑膦酸钠片治疗。分别于治疗前及治疗6个月后对患者进行股骨近端骨密度测定及疼痛模拟视觉量表(VAS)和日常生活活动(ADL)评分。**结果:** 治疗前两组患者股骨近端骨密度、VAS和ADL评分差异均无统计学意义(均 $P>0.05$)。治疗6个月后, 两组患者的上述指标均较本组治疗前有明显改善, 组内差异均有统计学意义(均 $P<0.01$); 易筋经组VAS及ADL评分改善情况优于药物组, 组间差异有统计学意义(均 $P<0.01$), 而股骨近端骨密度的组间差异无统计学意义($P>0.05$)。**结论:** 易筋经锻炼能有效改善原发性骨质疏松症老年患者的骨密度, 减轻疼痛, 改善其日常生活活动能力, 其整体效果优于口服阿仑膦酸钠片。

【关键词】 易筋经; 导引; 锻炼; 骨质疏松症; 骨密度; 疼痛; 日常生活活动; 老年人

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Osteoporosis is an imbalance between bone resorption and bone formation. It is a systemic skeletal disease characterized by low bone mass and micro-architectural deterioration of bone tissue with a consequent increase in bone fragility and susceptibility of fractures. Primary senile osteoporosis is associated with the normal process of aging. It's generally believed

to be related to endocrine, nutrition and exercise. Individuals may experience pain, a shortened height, fractures and hunchback^[1]. As the older population continues to grow, senile osteoporosis tends to affect more and more people. As a result, osteoporosis-related pain, fracture and complications start to have a great impact on the quality of life in the aged population.

To date, the treatments for osteoporosis can be divided into two types: medication and physiotherapy. However, the adverse reactions and expenses from long-term administration of medication have restricted

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its application and undermined the compliance. Physiotherapy has less adverse reactions, and is low-cost and easy-to-operate, but produces a significant efficacy. Thus, it has been gradually accepted by osteoporosis patients. During the recent years, we adopted Yi Jin Jing (Sinew-transforming Qigong Exercises) to treat primary osteoporosis in the elderly, and the report is as follows.

1 Clinical Materials

1.1 Diagnostic criteria

The diagnosis was made by referring to the *Expert Consensus on Diagnosis Criteria of Chinese Osteoporosis* (3rd draft, 2014)^[1]: aged over 70 in men, or over 20 years after menopause in women; trabecular bone loss or cortical bone loss, related to aging but not to sex hormone dependence; dorsal pain; shortened height or hunchback; bone fracture, often in spine (multiple-wedge) and hip (femoral neck, tuberosity); bone mineral density (BMD) of the proximal femur lower by over 2.5 standard deviations (SD) compared to normal young adults.

1.2 Inclusion criteria

Conforming to the diagnostic criteria of osteoporosis above; informed consent form.

1.3 Exclusion criteria

Complicated with fracture or severe underlying diseases, unsuitable for exercises; mental disorders; failed to follow the prescript treatment protocol, which affected the therapeutic efficacy; having received medications for osteoporosis within the latest 3 months.

1.4 Quality control

According to the characteristics of patients, proficient doctors demonstrated the exercises during the first 2 weeks, unified the time and intensity of practice, and stipulated the practice diary and health education pamphlet. Each participant was followed up and offered a notebook when they mastered the exercises, to ensure the practice frequency and quality.

1.5 Statistical analysis

The SPSS 13.0 version software was adopted for statistical analysis. Measurement data in normal distribution were expressed as mean \pm standard deviation ($\bar{x} \pm s$) and analyzed by *t*-test; those not conforming to normal distribution were analyzed by non-parametric test. Enumeration data and ranked data were treated by Chi-square test or rank-sum test. $P < 0.05$ indicated a statistical significance.

1.6 General data

A total of eighty patients were recruited from the

outpatient or ward of Acupuncture and Tuina Department, Jiaying Hospital of Traditional Chinese Medicine Affiliated to Zhejiang Chinese Medical University. The patients were randomized into a Yi Jin Jing group and a medication group. The general data were equivalent between the two groups, and the between-group differences were statistically insignificant (all $P > 0.05$), indicating the comparability (Table 1).

Table 1. Comparison of clinical data

Group	n	Gender (case)		Average age ($\bar{x} \pm s$, year)	Average duration ($\bar{x} \pm s$, day)
		Male	Female		
Yi Jin Jing	40	18	22	75.5 \pm 2.6	94.2 \pm 6.5
Medication	40	14	26	74.3 \pm 4.3	114.4 \pm 7.2

2 Treatment Methods

2.1 Yi Jin Jing group

Under the guidance of doctor, patients in this group practiced the simplified 12-movement Yi Jin Jing (Sinew-transforming Qigong Exercises)^[2-3]. Prior to the practice, patients were required to get themselves ready, wearing loose and comfortable clothes, specific shoes for exercise or soft-sole cloth shoes (Figure 1). During the practice, patients should clear away distracting thoughts and performed each movement in a stretching, slow and soft way instead of forceful. After practice, patients should keep warm and away from wind. The exercises were practiced twice a day, better to have slight sweating each time (Figure 2).

2.2 Medication group

Patients in this group were prescribed with oral administration of alendronate sodium tablet (Hangzhou MSD Pharmaceutical Company, China), once a week, 70 mg per dose.

The two groups underwent efficacy evaluation after 6-month intervention.



Figure 1. Preparation posture

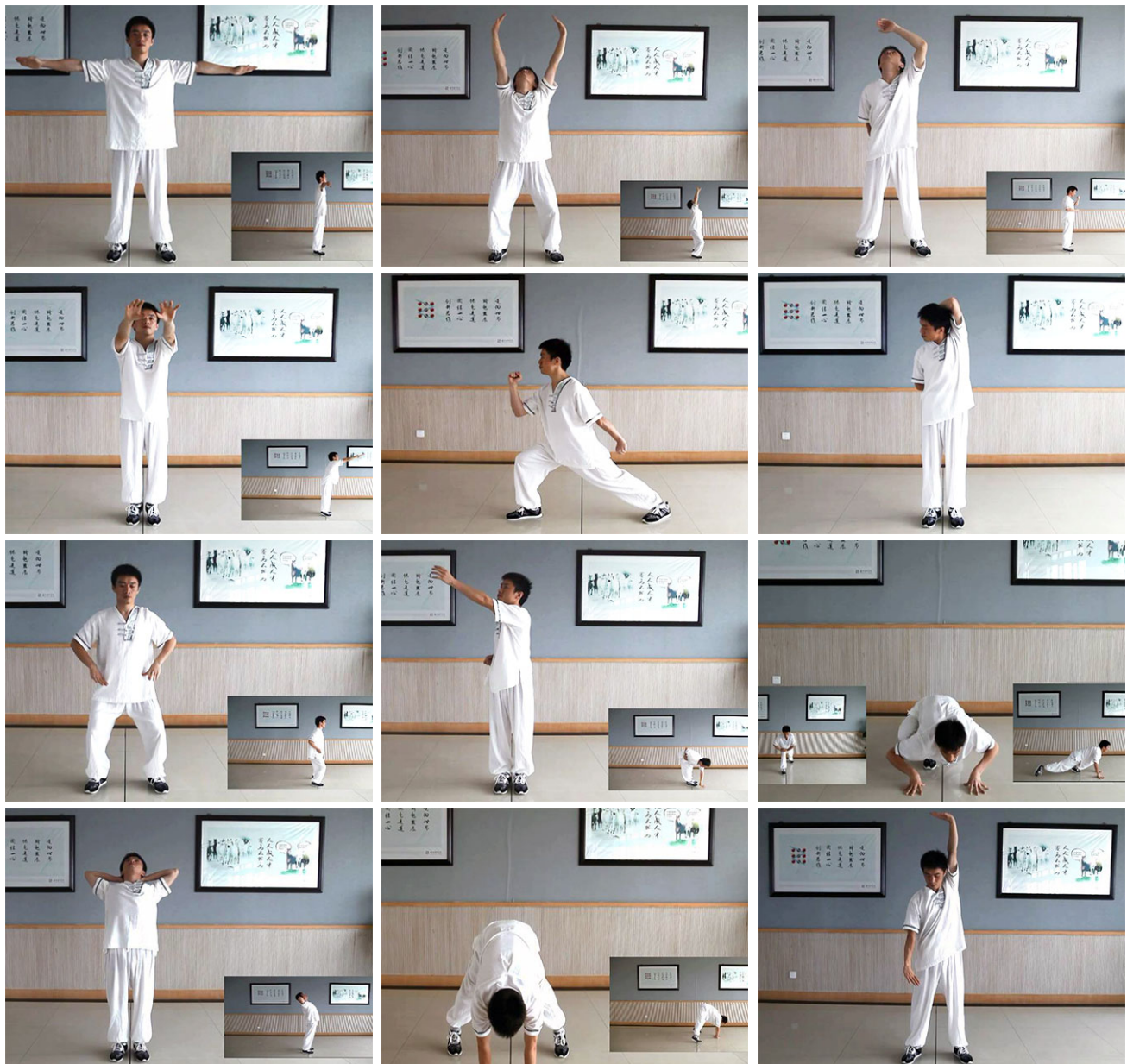


Figure 2. 12-movement Yi Jin Jing (Sinew-transforming Qigong Exercises)

3 Observation of Therapeutic Efficacy

3.1 Items

3.1.1 BMD

The dual-energy X-ray absorptiometry (Hologic QDR 4500W, USA) was adopted to measure the BMD of the proximal femur.

3.1.2 Visual analog scale (VAS)

A thread of 10 cm in length was marked 0 point at the left end standing for painless and 10 points at the right end for unbearable pain. 1-3 points represented mild pain; 4-6 points as moderate pain; 7-9 points as severe pain.

3.1.3 Activities of daily living (ADL)

A quantitative observation of patients' ADL was

conducted based on Barthel index (BI). ADL consisted of 10 items which all contained 2-4 questions. Each question was scored 0, 5, 10 or 15 points corresponding to the capacity, 100 points as the full score. <20 points was considered as extremely serious functional defect, and the living was completely dependent; 20-40 points meant that major help was needed; 40-60 points meant that minor help was needed; >60 points stood for substantially independent.

3.2 Results

3.2.1 Comparison of BMD of the proximal femur

There was no statistical difference in BMD of the proximal femur before the intervention between the two groups ($P>0.05$). After 6-month intervention, BMD of the proximal femur increased significantly in both

groups (both $P<0.01$), without a statistical between-group difference ($P>0.05$), (Table 2).

3.2.2 Comparison of VAS and ADL scores

There were no significant differences in VAS and ADL scores between the two groups before the intervention (both $P>0.05$). After 6-month intervention, VAS and ADL scores improved significantly in both groups (all $P<0.01$), and the improvements in the Yi Jin Jing group were more significant compared to those in the medication

group (both $P<0.01$), (Table 3).

Table 2. Comparison of BMD of the proximal femur ($\bar{x} \pm s$, g/cm²)

Group	n	Pre-intervention	Post-intervention
Yi Jin Jing	40	0.58±0.14	0.79±0.13 ¹⁾
Medication	40	0.55±0.19	0.68±0.11 ¹⁾

Note: Intra-group comparison, 1) $P<0.01$

Table 3. Comparison of VAS and ADL scores ($\bar{x} \pm s$, point)

Group	n	VAS		ADL	
		Pre-intervention	Post-intervention	Pre-intervention	Post-intervention
Yi Jin Jing	40	6.89±1.02	1.76±0.42 ¹⁾²⁾	34.37±4.82	86.27±7.14 ¹⁾²⁾
Medication	40	6.74±0.84	3.16±0.73 ¹⁾	36.44±5.13	79.36±6.75 ¹⁾

Note: Intra-group comparison, 1) $P<0.01$; compared with the medication group after the intervention, 2) $P<0.01$

4 Discussion

Senile primary osteoporosis, or degenerative osteoporosis, is a specific sign of aging in skeleton. The patients usually have lower quality of life in multiple dimensions compared to normal people, and the major causing factors are pain, fracture, decreased ADL and the subsequent negative emotions and fear. Thus, it has become the main targets to increase BMD, release pain, increase muscle force, improve balance, reduce the risk for fracture, enhance ADL, and eliminate negative feelings in the treatment of osteoporosis^[3].

Yi Jin Jing (Sinew-transforming Qigong Exercises) is one of the Chinese Daoyin exercises. 'Yi' means change; 'Jin' refers to muscles and sinews; 'Jing' means method. Generally, Yi Jin Jing refers to a method to change muscles and sinews. Taking body regulation, breath regulation and mind regulation as the principle, the practice of Yi Jin Jing (Sinew-transforming Qigong Exercises) emphasizes the integration of motion and stillness and combination of firmness and flexibility, with qi and attention guided by movements, external flexibility for stretching the body and internal firmness for protecting the heart and regulating the breath. The final aim is to release the spastic, fortify the weak, elongate the shrunken, and firm the rotten sinews^[4-7]. Galileo was the first one who noticed the relation between mechanical stress and bone mass in 1683. In 1892, Julius Wolf discovered the influence of mechanical stress on bone strength. Weinans H, *et al*^[8] found that the mechanical load produced by muscle can trigger the osteoblasts to increase bone mass. Modern research has indicated that the reduction of skeleton muscle is a crucial inducing factor of osteoporosis. Practice of Yi Jin Jing (Sinew-transforming Qigong

Exercises) can increase the flexibility and strength of skeleton muscle, fortify the function of skeleton muscle, improve the agility and balance of body, reduce falling accidents and the incidence of osteoporosis-induced fractures^[9-13]. Meanwhile, through breath and mind regulations, Yi Jin Jing (Sinew-transforming Qigong Exercises) can ease the tension, and improve the anxiety and depressions states, hence effectively helping the mental health^[14-17].

The current study showed that Yi Jin Jing (Sinew-transforming Qigong Exercises) effectively improved BMD of the proximal femur, as well as VAS and ADL scores, producing a more significant general efficacy compared to oral administration of alendronate sodium tablet. Therefore, Yi Jin Jing (Sinew-transforming Qigong Exercises) is suggested to improve BMD and living condition of senile osteoporosis patients. Moreover, since it's easy-to-operate and produces no adverse reactions^[18-20], this training is worth promoting in communities.

Conflict of Interest

There was no potential conflict of interest in this article.

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Statement of Informed Consent

Informed consent was obtained from all individual participants included in this study.

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