A survey of osteoporosis prevent program in older people: measurement of a 3 month exercise trial and diet guidance on bone density, body form and sports ability

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Purpose

Osteoporosis is an increasing public health problem that causes loss of life and reduced quality of life in sufferers. In Japan, the report of older people's life status from Tokyo Welfare Center is showed that the incidence of bedridden among older people caused by hip fracture was increased from 7.4% to 11.5% in the recently ten years, and that also trends to increase. It is well-known that along with increasing age, reducing function and bone density, unreasonable diet and life habit, the incidence of osteoporosis will be lead to increase. Strategies to improve bone density and reduce the likelihood of falls are important in the prevention of osteoporosis.

Because of the side effect of hormone treatment, exercise and reasonable diet (rich calcium and Vitamin D, et al) may have more considerable benefits in the prevention of osteoporosis. In the middle adult years, small increases in bone mass may be achieved by structured weight-training and weight-bearing exercise. In the older adult years, the aim is to conserve bone mass, reduce the risk of falls, promote extended posture, and improve mobility and function.

In this study, we propose to execute the prevention program by exercise and diet guidance during three months intended for the elder adults, attempt to realize the effect of this program on bone density, body form and sports ability, and consummate this program to a better approach for improving the quality and quantity of elder adults life.

Key words: Prevent of osteoporosis, older people, Exercise, Diet

Methods

(1) *Subject:* 18 general elderly volunteers over 60 years old (age=67±5.37yr old; 5-male & 13-female) were assembled to participate in a osteoporosis prevention program in Health Promoting Center. Among all of them, there were 5 with hypertension, 4 with hyperlipoidemia and, 4 with gastric ulcer. 15 of them also had waist pain and knee pain. During the last year, 6 subjects experienced falls and 4 of them fell more than 2 times. There is neither diagnostic approaches nor strategies of hormone treatment for these osteoporosis sufferers at present.

(2) *Period:* This program was carried out from 13:30 to 15:30 each time and once per week for a total period of 12 weeks.

(3) _Methods:_ This program was designed to follow the physical fitness of those subjects before exercise. These subjects affirmed their health diagnoses, anamnesis, and so on. Furthermore, a questionnaire was performed on osteoporosis, life style, smoking, eating and drinking, stress and related activities. The osteoporosis prevention program consisted of diet guidance, muscle tension training and walk training. In details, it included stretch, balance ball, step, zigzag footwork, walk in pool, bicycle, muscle training by machine.

(4) _Items:_

▷ Physical characteristics: height, weight, BMI, Fat%(TANITA TBF-210), length of lower extremity, waist/hip ratio, thigh circumference

▷ Function: blood pressure, heart rate, bone density (in heel, measured from ultrasonic dual energy X-ray absorptionmetry Corp.CM-100)

▷ Sports ability: 10m maximal walk, 10m obstacle walk, step on the 40cm-height box, a stride, grip, stand with one foot and open eyes, The time of score step follow a beeline

Results

During the period of 3 months, the average exercise frequency was 26.4 times (8~53times). The diet guidance was follow with exercise.

The results of body form measure showed that the value of weight, BMI, waist and Fat% increased after program. The Fat% was dramatically changed (P<0.05), and the bone density was significantly different between pre-program and post-program (P<0.01). As expected, the systolic blood pressure (SBP) and diastolic blood pressure (SBP) was

clearly declined (p<0.05).

The results of sports ability indicated that the time of standing with one foot and open eyes was increased after program (p<0.01), and the time of score step following a beeline was reduced (p<0.01). However, the time of 10m maximal walk, obstacle walk and step on the 40cm-height box were no significant changes.

The result of questionnaire showed that the times of rich calcium food ingest increased. The senses of health, confidence and satisfaction after program were much better than before. Therefore, the change of bone density was closely related with the change of sense of health (p<0.05).

Discussion

Osteoporosis, a disease characterized by low bone mass, microarchitectual deterioration of bone, and susceptibility to bone fractures, can lead to debilitating pain and deformity. Easier to fall is the leading cause of injury, deaths, and disabilities among people older than 65. The risk factors for osteoporosis include increasing age, postmenopausal women, thin frame, and functional limitations, reducing bone density, muscular weakness and individual diathesis. Therefore, we propose to execute a preventing program including both exercise and diet guidance, intend to increase the subject's bone density and reduce their likelihood of falls without medication.

For these adults living in the community, the results of physical health status (weight, BMI, body fat), which increased after three months may have an effect by rich food and exercise load is not adapt to those people perfectly. It suggested that the balance of ingest and consumption is rather important for older people in addition to prevent osteoporosis. Certainly, the increasing of rich calcium ingest and regular exercise were main

reasons of the bone density increasing after program.

The time of score step following a beeline was reduced after exercise (P<0.01), suggesting that the function of neural system has improved. It's also consist with the increase of the time of standing with one foot and open eyes after program (p<0.01), which also indicated that the muscular strength of lower limbs seemed to increase. Although this tendency had no obvious connection with the change of bone density, our results showed that the increasing of muscle strength would support the improvement of walking and be benefit for preventing falls. Similar to the exercises adopted in our program, conventional fitness might indirectly protect individuals from fractures by improving mobility and muscle function, and by reducing the risk of falls.

It was found that the change of bone density was related to the change of sense of health (p<0.05), suggesting that approaches to increase bone density of older people might contribute a lot to the improvement of the quality and quantity of their life. Furthermore, we found that the change of blood pressure was significantly different between pre-program and post-program (p<0.05), indicating that our prevention program might be also suitable for hypertension.

In summary, our prevention program by exercise and diet guidance was clearly applicable for the elderly adults. However, due to the significant variation of the physical fitness individual among the older people, one should carefully measure the physical fitness and evaluate it in a better way, and reflect it in an effective movement prescription in the future.

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