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Original Article

Evaluation of Sarcopenia in Elderly Women of China

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SUMMARY

Background: Sarcopenia is a continuous process defined as a decline in both muscle mass and strength, which is a common phenomenon among elders and has been linked to multiple adverse clinical consequences. Varieties of factors contribute to the occurrence of sarcopenia. In the present study, we aim to observe the prevalence of sarcopenia in elderly women of China, and examine the effects of aging on the body composition change in China older women.

Methods: 177 participants included 35.6% young women and 44.4% elderly women took part in this study between February 2015 and August 2015. All volunteers took dual energy X-ray absorptiometry tests for body composition assessment and physical-performance tests for physical function assessment.

Results: Elderly women had greater total fat mass (25.2 ± 6.9 *vs* 22.5 ± 5.9, $P = 0.008$) and percentage fat mass (45.1 ± 7.3 *vs* 41.7 ± 5.5, $P < 0.001$) than those in the young women. However, appendicular lean mass (ALM) and ALM/Height^2 did not show statistical significance between young and older women. In spite of an equal muscle mass between two groups, the muscle strength (hand-grip strength, HGS) and physical function decline were more rapidly developed in elderly women, compared with their young counterparts.

Conclusion: Our findings suggested that both aging and menopause contributes to the decline of muscle strength and physical function rather primarily than the loss of muscle mass in the process of sarcopenia in Chinese older women. Hand-grip strength criteria is more sensitive to diagnose sarcopenia in elderly women of China.

1. Introduction

Aging is a common trend in both developed and developing countries.[1] According to World Health Organization, the number of people aged 60 years or older was 600 million in the year 2000, and will reach 1.2 billion by the year 2025.[2] Aging results in a progressive decline of skeletal muscle mass, function, and strength. The age-related process is known as sarcopenia.[3] Sarcopenia is a disorder of advanced age, which has a close relationship with falls, physical disability, and increased mortality.[4] According to a variety of researches, the cause of sarcopenia is multifactorial, including malnutrition, neurodegenerative diseases, chronic illnesses, and metabolic diseases, all those contribute to the development of sarcopenia.[5]

Body composition is changed greatly during postmenopausal period. In elderly women, reduced body activity and changes in endogenous hormonal balance, such as estrogen levels decline, cause an increase of visceral fat mass, and a reduction of muscle mass as well as muscle strength.[6] As a result, older women are more susceptible to present sarcopenia, as opposed to young women and men. Although the prevalence of sarcopenia in elderly women has been widely reported in Brazil,[7] America,[8] and Europe,[9] fewer studies have focused on the effect of aging on the body composition change in Asian older women. Unlike European and American ones, the Asian population is thinner, and thus their body composition is different from those of Western population. Therefore, we aim to evaluate the body composition including the low muscle mass (reflected by appendicular lean mass) in elderly women of China.

Dual energy X-ray absorptiometry (DXA) is a practical technique applied for distinguishing lean, fat, and bone mineral tissues,[9] which has been used widely for assessment of changes in body composition. Moreover, DXA also provides measurements of lean mass (LM) for arms, legs and trunk. The sum of lean mass for arm and leg has been defined as appendicular lean mass (ALM), which

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had usually been divided by height squared to form relative ALM.[10] The relative ALM two standard deviations below the data of young counterparts is one of the criteria to diagnose sarcopenia.[11]

2. Materials and methods

2.1. Ethical approval of studies and informed consent

All women volunteers signed written informed consent in accordance with the guidelines of institution, and the research was approved by the Human Ethics Committee of the First Affiliated Hospital of Medical College, Zhejiang University, China.

2.2. Patients information

114 elderly women with a mean age of 67.9 years, and 63 young women aged 33–40 years (mean age 39.1 years) (Patients received to physical examination, relatives of patients and medical staff) with no recorded tumor, metabolic diseases or other neurodegenerative diseases known to affect the musculoskeletal system) were recruited by public advertisement between February 2015 and August 2015 at the Department of Geriatrics, First Affiliated Hospital of Medical College, Zhejiang University (Fig. 1). The data calculated from young women were used as reference values to define cutoff values for appendicular lean mass (ALM).

2.3. Clinical and laboratory parameter analysis

Body height and weight were measured via a stadiometer (Holtain, Crymych, UK) with participants barefoot and in light clothing. All blood samples were obtained from the antecubital vein in the morning, after fasting of over 8 h, and were subjected to analysis using the Beckman-Coulter HMX automated system (Beckman-Coulter, Brea, CA, USA) to analyze the biochemical blood parameters, including the calcium, cholesterol, triglyceride and albumin.

2.4. Body composition

Fan-beam dual energy X-ray absorptiometry (DXA; Discovery-W, Hologic, Bedford, MA, USA) was applied to measure fat mass (FM), lean mass (LM), total body water (TBW), and basal metabolism rate (BMR). In addition, the body mass index (BMI) was calculated by dividing weight in kilograms by height in meters squared (kg/m^2). Appendicular lean mass (ALM) was calculated by summing up lean mass for both arms and legs.

2.5. Hand-grip strength test

Hand-grip strength was measured applying a hydraulic hand dynamometer (Jamar Preston, Jackson, MI, USA) with forearms in a neutral position, and elbows flexed to 90°. The participants were instructed to grip the device as much as possible, the dominant hand was tested three times and the highest kilogramme was recorded for the statistical analyses.

2.6. Physical function

Physical-performance was measured using gait speed, standing balance, and a five times sit-to-stand test according to Short Physical Performance Battery (SPPB) protocol (www.grc.nia.nih.gov/branches/ledb/sppb/) developed by the National Institute on Aging.[12] In gait speed test, a flat unobstructed course was identified in a clinic assessment room, and 2.4 m were marked out with tape. The participants were asked to walk at their normal pace to finish a distance of 2.4 m, the time to fulfill the test was recorded by a stopwatch. The gait speed was recorded as 2.4 m divided by time. In standing balance test, the participants were required to maintain

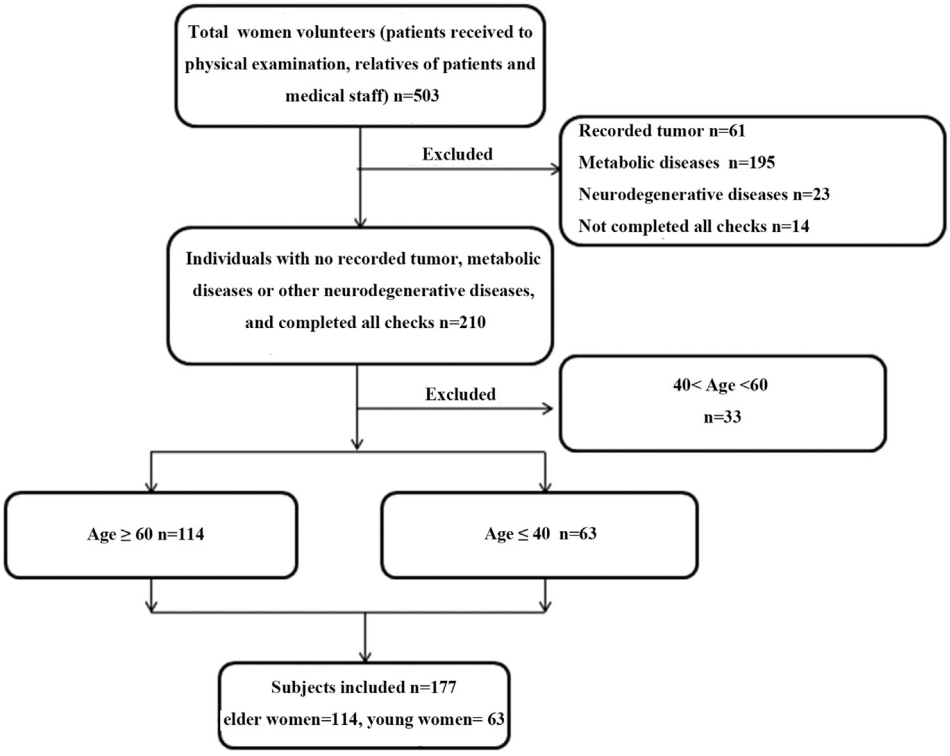

Fig. 1. Flow chart of participants selection.