ARE CURRENT DEFINITIONS OF SARCOPENIA APPLICABLE FOR OLDER CHINESE ADULTS?

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Abstract: This study aims to explore whether the current definitions of sarcopenia are applicable to the older Chinese population. Participants were 783 Chinese adults recruited from four regions in Mainland China: Jinan, Guangzhou, Xi’an, and Chengdu. Body composition was measured by dual energy x-ray absorptiometry. Handgrip strength, body weight, and height were measured by trained technicians, and demographic data were collected through questionnaires. Relative appendicular skeletal muscle, skeletal muscle index (SMI=100×skeletal muscle mass/body mass) and residuals methods were applied to identify sarcopenia. Compared with young adults, no significant decrease was found in the relative appendicular skeletal muscle (ASM/height²) in older adults. If the criterion of two standard deviations below the mean value of ASM/height² in young adults is used, none of older adults in this study could be diagnosed with sarcopenia. In addition, compared with the ASM/height² and residuals methods, SMI shows higher discriminating power in the identifying persons with low handgrip strength. The data suggest that ASM/height² method may not be appropriate for diagnosis of sarcopenia in Chinese population. However, whether SMI is a better choice remains inconclusive. Prospective studies are needed to clearly define sarcopenia in Chinese population.

Key words: Sarcopenia, aging, handgrip, appendicular skeletal muscle.

Introduction

Sarcopenia is a geriatric syndrome characterized by the loss of skeletal muscle mass and strength with advancing age (1). Sarcopenia may lead to some adverse consequences including decrease in balance, falls, fractures, weakening of endurance capacity, physical disability, poor quality of life, and increased mortality (2–5). The direct healthcare cost for sarcopenia in the United States was estimated to be USD 18.5 billion in 2000 (6). Therefore, establishing a valid definition of sarcopenia is very important to translate the concept from a research setting to the clinical area (4).

Although a variety of studies have been conducted during the past 10 years, a widely accepted definition for sarcopenia remains lacking (7). The first definition of sarcopenia was based on relative appendicular skeletal muscle (ASM), which was calculated as ASM in kilograms divided by height in squared meters. Sarcopenia was defined as ASM/height² being less than two standard deviations (SDs) below the mean of young male and female reference groups (8). This definition was the basis for sarcopenia cutoff points for Chinese population in 2005 (9), which have been widely applied in the studies on Chinese population (10, 11). However, notably, the cutoff points for Chinese (men: 5.72 kg/m²; women: 4.82 kg/m²) were calculated using the data derived from only 111 young volunteers (28 male and 83 female). Therefore, the data may not accurately reflect the skeletal muscle mass level of young Chinese adults and could cause bias in the diagnosis of sarcopenia in the Chinese population. Furthermore, the mean ASM/height² of young Asian adults has been reported to be approximately 15% lower than their Western counterparts. This would lead to lower cutoff points for sarcopenia and lower prevalence of sarcopenia (9). However, whether the lower cutoff points for Chinese population are reasonable remains unclear.

In the past, other methods have been established to define sarcopenia. In 2002, Janssen et al. proposed a skeletal muscle index (SMI=100×skeletal muscle mass/body mass) (12). Subjects whose SMI were within one to two SDs below the mean SMI of young adults (aged 18 to 39 years) were diagnosed as having Class I sarcopenia and those with SMI below two SDs were defined as having Class II sarcopenia. Recently, some researchers have recommended an alternative definition of sarcopenia: the residuals method, which take both height and body fat into consideration (1, 13). The European Working Group on Sarcopenia in Older People (EWGSOP) has summarized these methods and recommends using the presence of both low muscle mass and low muscle function (strength or physical performance) for the diagnosis of sarcopenia (7). However, because these definitions for sarcopenia are based on studies in Western countries, whether the criteria for sarcopenia could be applied in the Asian context, especially when the ethnic difference in body composition is considered, also remains unclear (14–16). Therefore, this study aims to examine whether the current definitions for sarcopenia are suitable for the Chinese population.

Methods

Study Design and Participants

The data of this study were from a national survey on body composition of the Chinese population. The nationally representative cross-sectional survey was conducted in 2006 in four regions in China: Jinan, Guangzhou, Xi’an, and Chengdu. Participants aged 18 or above were randomly recruited from the residents living in the four regions. The sample size recruited in
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Descriptive statistics are summarized in Table 1. The mean of ASM/height² for young men and women (18–39 y) were 8.0 ± 1.1 kg/m² and 6.1 ± 0.9 kg/m², respectively. Compared with young adults, BMI, total fat mass, and total body fat (%) were significantly higher in both middle age (40–59 y) and older (60–69 y) Chinese adults. Compared with young adults, older men had significantly lower total lean body mass and ASM. However, total lean body mass and ASM of older women were not significantly lower than those of young adults. Notably, no significantly lower ASM/height² was found in older men and women compared with young men and women (Figure 1). In contrast, SMF and handgrip strength in older adults significantly decreased. Moreover, higher total body fat was found in both older men and women compared with their young counterparts.

Based on ASM/height², none of older adults could be diagnosed as afflicted with sarcopenia (two SDs below the mean value of young adults). If SMF method was used, the prevalence of Class I (one SD below the mean value of young adults) and Class II (two SDs below the mean value of young adults) sarcopenia were 39.4% and 0% for older men and 25.6% and 17.9% for older women respectively. Furthermore, 33.3% of older men and 25.6% of older women were identified as affected by sarcopenia if the residuals method was used.

ROC curves were used to compare the discriminating power of ASM/height², SMF, and residuals in detecting handgrip weakness. The data show that AUCs for SMF were 0.83 and 0.79 in men and women (Figure 2). In contrast, the AUCs for ASM/height² and residuals in both men and women were much lower. Compared with ASM/height² and residuals methods, SMF showed higher discriminating power in identifying persons with low handgrip strength.