

Original article

# The prevalence of sarcopenia and related factors in a community-dwelling elders Thai population

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Received 1 March 2016; revised 11 April 2016; accepted 2 May 2016

Available online 1 June 2016

## Abstract

**Background:** Sarcopenia is one of common problems among elderly worldwide.

**Objectives:** Sarcopenia is one of common problems among elderly worldwide. To determine the prevalence of sarcopenia and related factors in community-dwelling elders Thai population.

**Methods:** This cross-sectional study was performed in 243 subjects aged over 60 years. All participants were evaluated for handgrip strength by dynamometer and for gait speed by walking a 6-m distance. The muscle mass for subjects who had abnormal grip strength and/or gait speed was evaluated by bioimpedance analysis (BIA). The prevalence of sarcopenia was calculated and factors related to sarcopenia were also analyzed. **Results:** The mean age was  $69.7 \pm 6.9$  years with three-fourths female participants. Approximate 60% of subjects were overweight. There were 74 participants (30.5%, (95% CI: 25.0%–36.5%)) with abnormal grip strength; gait speed and muscle mass. Males had more prevalence than females (33.9% vs. 29.3% respectively). There is higher prevalence with increasing age among both genders (17.9%, 41.4% and 80.0% in young old, middle old, and the very old groups respectively in male; and 11.5%, 49.1%, and 65.0% in female). After using multivariate analysis, age, body mass index (BMI), and quadriceps strengths were significantly related to sarcopenia with the adjusted odds ratio of 15.47 (95% CI: 4.93, 48.54), 12.84 (95% CI: 3.85, 42.82) and 3.77 (95% CI: 1.70, 8.37) respectively.

**Conclusions:** Thirty percent of the community-based elderly experienced sarcopenia. As the prevalence is high, the screening for sarcopenia should be performed in community-dwelling elders especially older age, underweight subjects and lower quadriceps strength.

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**Keywords:** Sarcopenia; Prevalence; Community-dwelling elders; Factors

## 1. Introduction

Sarcopenia is a disease of progressive loss of muscle mass and associated with a decrease in muscle strength as well as

physical performance [1]. The International Working Group on Sarcopenia proposed definition of sarcopenia in 2009 as “age-associated loss of skeletal muscle mass and functions which were strength and performance as well” [2]. Nowadays, sarcopenia becomes public interest and is recognized worldwide. Its consequences greatly impact on muscle performance, functional decline, physical disability, poor quality of life and even death in some patients. It can affect the ability to maintain an active lifestyle and associate with mobility limitation [3].

Furthermore, the healthcare costs for sarcopenia is high. Janssen and colleagues reported the estimated direct

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Peer review under responsibility of The Korean Society of Osteoporosis.

healthcare cost of sarcopenia of \$18.5 billion in US in the year 2000 (1.5% of total healthcare expenditure) [4], the healthcare cost was in excess of \$860–933 for every client with sarcopenia. A 10% reduction in the prevalence of sarcopenia can save \$1.1 billion dollars per year. This represents very high healthcare costs in USA. As sarcopenia is commonly found in elderly with advancing age, prevalence of sarcopenia is an important societal and public health concern.

Many studies reported the prevalence of sarcopenia which varied in method, criteria or type of elderly. Cruz-Jentoft and colleagues performed asystemic review published in 2014 on the prevalence on sarcopenia which ranged from 1 to 29% of the older adults living in the community [5]. In addition, this number increased to 14–33% for the long-term care older residents [6,7]. In rehabilitation setting, the prevalence was higher up to 60% among elder patients admitted in rehabilitation ward [8].

Besides from the prevalence of sarcopenia, factors related to it were also crucial. Concerning to those factors, some studies reported age, gender and level of physical activities as factors related to sarcopenia [9,10]. Beasley et al. mentioned the risk factors for sarcopenia as age, malnutrition and physical inactivity [11]. Furthermore, some believed its causes were from multiple factors including disuse, malnutrition, age-related cellular changes, apoptosis, and genetic predisposition as presented by Hida and colleagues [12]. Walston JD also reported multiple factors such as neurological decline, hormonal changes, inflammatory pathway activation, declines in activity, chronic illness, fatty infiltration, and poor nutrition served as contributing factors to sarcopenia [3].

As sarcopenia is one of the major health problems in aging, the current study objectives were to investigate the prevalence of sarcopenia in community-dwelling Thai elders and related factors.

## 2. Methods

This study has a cross-sectional design. In April 2015, personnel from Department of Rehabilitation Medicine, Faculty of Medicine Siriraj Hospital performed corporeal social responsibility (CSR) activity in Ampawa Province, Samut-songkram, in central Thailand. “CSR” means any activities that an organization performs for the sake of humanity with respect to society. Staff in our department volunteered to create health activity among community-residing elderly aged more than 60 years. Our activities were to investigate health status and giving health education about the common musculoskeletal diseases in elderly including sarcopenia, osteoarthritis, osteoporosis, and fall prevention. To avoid selection bias, all participants were elderly who could walk and join our activity at the city hall of Ampawa Province. This study was approved by the Ethical Review committee of the Faculty of Medicine, Siriraj Hospital.

Demographic data including age, sex, body weight, height, and underlying diseases were recorded. Those underlying diseases were diagnosed by their primary doctor. Fall frequency was assessed by asking participants with the sentence “Have you ever had a fall (or falls) this year?” In addition, the

body mass index was calculated from weight/height (meter)<sup>2</sup> and was categorized into 3 groups: underweight (BMI < 18.5 kg/m<sup>2</sup>), normal (BMI = 18.5–23.0 kg/m<sup>2</sup>) and overweight (BMI > 23.0 kg/m<sup>2</sup>) [13]. To investigate health status, the quadriceps strength of dominant leg was measured twice in a sitting position by using hand-held dynamometer, Lafayette Manual Muscle Test System (MMT)<sup>®</sup> model 01163 (Lafayette Instruments, Lafayette, IN, USA). The maximal value was selected. The cut-off value for quadriceps strength in male and female were 18.0 and 16.0 kg respectively [14].

For assessment of physical performance, grip strength and gait speed were evaluated. Grip strength was measured by using hand-held dynamometer (Jamar hand dynamometer, Preston Jackson, Michigan, 49203, USA). Participants sit upright, adducted arms beside trunk and flexed elbows 90°. They were asked to hold hand dynamometer tightly and squeezed as strongly as they could. They were allowed to practice once before testing. Then, the grip strength was tested in dominant hand twice, and the maximal value was selected. The cut-off values in male and female were 26 kg and 18 kg respectively [15]. The gait speed was evaluated by asking participants to walk 10-m distance. Time was recorded from the 2-meter to 8-m marker. Then, the gait speed was calculated from time using in 6-m walk with the cut-off value of 0.8 m/s [16].

Participants who had abnormal handgrip strength and/or gait speed were evaluated for lean body mass by using Bio-impedance Analyzer Model 450 (Biodynamics, Seattle, WA, USA). We calculated lean body mass from percentage of whole body skeletal mass multiplied by body weight, and divided by 100. The one who had lean body mass less than 7 kg/m<sup>2</sup> in male or 5.7 kg/m<sup>2</sup> in female were considered abnormal muscle mass [15]. Then, the prevalence of sarcopenia was calculated. In addition, the prevalence categorized by different gender, different age groups (young old: 60–69 years; middle old: 70–79 years; the very old: ≥80 years) and among different gender and different age groups, were done. The factors related to sarcopenia were analyzed including age, sex, body mass index (BMI), history of falls and quadriceps strength.

### 2.1. Statistical analysis

The continuous data was presented as mean ± standard deviation (SD). The categorical data was presented as number (n) and percentage (%). Univariate factors related to sarcopenia were analyzed using chi-square test. Multiple logistic regression was used to adjust for confounding for multivariate analysis. The strength of association was measured using odds ratio (OR) with 95% confidence intervals (95% CI). The p-value of <0.05 was considered statistically significant. Data analysis was performed with PASW Statistics (SPSS) 18.0 (SPSS Inc., Chicago, IL, USA).

## 3. Results

The total number was 243 elder participants with a mean (SD) of 69.7 (6.9) years. Three-fourths of participants were

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