Archives of Gerontology and Geriatrics 68 (2017) 49–54

Contents lists available at ScienceDirect

Archives of Gerontology and Geriatrics

journal homepage: www.elsevier.com/locate/archger

Prevalence of sarcopenia and associated factors in the healthy older adults of the Peruvian Andes

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ARTICLE INFO

Article history:
Received 5 May 2016
Received in revised form 6 September 2016
Accepted 7 September 2016
Available online 12 September 2016

Keywords:
Activities of daily living
Body mass index
Instrumental activities of daily living
Motor activity
Sarcopenia

ABSTRACT

Aim: To assess the prevalence of sarcopenia and associated factors in a population of older people living in a rural area of the Peruvian Andes.
Materials and methods: The study concerned 222 people aged ≥65 years. Sarcopenia was diagnosed on the basis of skeletal muscle mass, measured using bioimpedance analysis, and gait speed, measured with the 4-m walking test, as recommended by the International Working Group on sarcopenia. Self-reported physical activity, the Short Physical Performance Battery, and the Six-Minute Walking Test also contributed information on participants' physical performance status. Disabilities were investigated by assessing participants' self-reported difficulties in performing one or more basic or instrumental activities of daily living.
Results: The prevalence of sarcopenia was 17.6%. Compared with participants without sarcopenia, individuals who were found sarcopenic were significantly older, female and were less frequently farmers, had fewer children, had a worse nutritional status, a significantly lower physical performance, and higher levels of disability in the instrumental activities of daily living. After adjusting for potential confounders, age, female sex, a low body mass index, a self-reported low physical activity level, a worse Six-Minute Walking Test scores, and a low number of children were significantly associated with sarcopenia.
Conclusion: The prevalence of sarcopenia seems to be quite high among community-dwelling older subjects in the Peruvian Andes. Age, female sex, a low body mass index, little physical activity, a poor Six-Minute Walking Test scores, and a low number of children could be associated with this condition.

1. Introduction

The International Working Group on Sarcopenia (IWGS) defined sarcopenia as "the age-associated loss of skeletal muscle mass and function" (Fielding et al., 2011). Sarcopenia is a complex syndrome that is associated with muscle mass loss alone or in conjunction with increased fat mass. The causes of sarcopenia are multifactorial and can include disuse, changing endocrine function, chronic diseases, inflammation, insulin resistance, and nutritional deficiencies. While cachexia may be a component of sarcopenia, the two conditions are not the same (Fielding et al., 2011).

A similar definition was provided by the European Working Group on Sarcopenia in Older People (EWGOP) (Cruz-Jentoft et al., 2010), and the agreement of IWGS and EWGSOP was only fair (Lee, Liu, Peng, Lin, & Chen, 2013). A simultaneous deficiency of muscle mass and muscle function is therefore necessary for a diagnosis of sarcopenia.

Several studies have investigated the prevalence of sarcopenia in elderly people. In 2014, for instance, the International Sarcopenia Initiative (ISI) (Cruz-Jentoft et al., 2014) reported a prevalence of sarcopenia from 1% to 33% across different elderly

Abbreviations: ADL, activities of daily living scale; ASMM, appendicular skeletal muscle mass; ASMMI, appendicular skeletal muscle mass index; BIA, bioimpedance analysis; BMI, body mass index; CI, confidence interval; EWGSOP, European Working Group on Sarcopenia in Older People; IADL, instrumental activities of daily living scale; ISI, International Sarcopenia Initiative; MNA, Mini Nutritional Assessment; OR, odds ratio; R, resistance; RI, resistive index; SPPB, Short Physical Performance Battery; VIF, variance inflation factor; Xc, reactance; 6MWT, Six-Minute Walking Test.

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http://dx.doi.org/10.1016/j.archger.2016.09.002
0167-4943/

populations. An important weakness of this line of research lies, however, in that all these studies were conducted in developed countries.

In the developed world, the prevalence of sarcopenia depends on well-known factors, such as age, gender, malnutrition and scarce physical activity (Ishii et al., 2014; Landi et al., 2012; Lin et al., 2013; Rolland et al., 2008). For community-dwelling subjects living in a rural Andean region, on the other hand, factors such as poverty, difficulty in accessing primary care, the Andean diet, and hostile environmental conditions might be associated with sarcopenia (Ministry of Economy and Finance of Peru, 2010; Ministry of Health of Peru, 2013). To our knowledge, no data on the prevalence of sarcopenia and associated factors are available for Peru, and especially for the rural Andean region. In the absence of any data relating directly to Peru, the prevalence of sarcopenia in Latin America as a whole has been estimated to range from 6.1% to 36.6% among community-dwelling elderly people (Barbosa-Silva, Bielemann, Gonzalez, & Menezes, 2016; Da Silva, Duarte, Santos, Wong, & Lebrão, 2014; Pereira, Ferreira Leite, & de Paula, 2015; Pagotto & Silveira, 2014), and even higher in some settings.

In the light of the above considerations, it seems important to explore the peculiar and modifiable factors influencing this condition, also in view of the predicted exponential growth in the elderly population in years to come, and in the negative consequences of aging. The knowledge of these factors could be of importance because sarcopenia is preventable if appropriately treated and since this condition is associated with several negative outcomes in the elderly. Moreover, these factors could be different from the other South American countries.

The aim of this study was therefore to assess the prevalence of sarcopenia and associated factors in a population of old people living in a rural area of the Peruvian Andes.

2. Methods

This study involved older adults (≥65 years) living in the district of Yanama (Yungay province, in the Ancash region of Peru), a rural area of the Peruvian Andes approximately 3400 mt above sea level. The National Institute of Statistics and Informatics (INEI) of Peru report a population of 472 older people for this district (30 June 2013) (INEI, 2013), equal to 6.7% of the whole population. Data were collected from June 2014 to March 2015. All tests were conducted at an affiliated walk-in clinic at the 'Mama Ashu' Hospital, and all community-dwelling individuals aged 65 years or more were invited to go to the ambulatory.

Subjects who met any of the following exclusion criteria were not enrolled: symptomatic cardiovascular or pulmonary diseases, evidence of severe renal impairment (requiring dialysis), acute infections requiring hospitalization, uncontrolled metabolic diseases (diabetes, anemia or thyroid disease), skeleton-deforming diseases or severe collagenopathies or rheumatic disease, agitation, dementia or psychosis, use of drugs or supplements capable of modifying body composition (e.g. corticosteroids, anabolic hormones), or a history or confirmed diagnosis of cancer in the previous 5 years. Among the 302 individuals initially screened, 80 were excluded in the light of the above-mentioned inclusion/exclusion criteria; the study sample thus included 222 subjects.

All participants were fully informed of the nature and object of the study and gave their consent. The study was conducted in accordance with the Declaration of Helsinki.

2.1. Clinical data

Social and demographic data were obtained by means of face-to-face interviews with the participants. Profession was categorized as farmer vs. others. A positive clinical history of cardiovascular diseases, diabetes, dyslipidemia, liver diseases, gastrointestinal diseases, osteoarthritis, osteoporosis, respiratory diseases, stroke, dementia, depression, degenerative brain diseases, renal diseases, genito-urinary diseases, fractures, or cancer with a 5-year recurrence-free follow-up was recorded. Drug intake was also recorded and categorized as ≥ vs. <3, since in the elderly taking more than 3 medications is a good proxy for polypharmacotherapy (Hanlon, Schmader, Ruby, & Weinberger, 2001).

Participants' weight and height were measured with subjects wearing light clothing and no shoes, using a balance equipped with a stadiometer (estimated error 0.1 kg for weight, and 0.1 cm for height). Arm circumference was measured at the midpoint from the acromion process of the scapula to the tip of the olecranon process of the mid-elbow; and calf circumference was measured at the widest point, with subjects in a supine position with their knee and ankle at right angles.

2.2. Nutritional status

The body mass index (BMI) and the Mini-Nutritional Assessment (MNA) were used to assess nutritional status. More specifically, BMI was calculated as the subject's weight in kilograms divided by the square of their height in meters; the variable was categorized as taking 20 as cut-off since this value seems to better discriminate underweight to normo-weight in the elderly (Veronese et al., 2013). The MNA is an internationally validated method based on 18 items that include anthropometric measures, health status, dietary patterns and subjective assessments of an individual's nutritional status (Guigoz, Lauque, & Vellas, 2002); this variable was categorized as <24 vs. ≥24, being this cut-off the value for dividing well-nourished from at risk of and malnourished (Vellas et al., 2006).

2.3. Physical performance tests

To assess their physical performance, participants were questioned about their daily physical activity (during the interview)and they completed the Short Physical Performance Battery (SPPB) and the Six-Minute Walking Test (6MWT).

Physical activity was assessed using the Global Physical Activity Questionnaire (GPAQ) developed by the WHO (World Health Organization) for physical activity surveillance in countries (Armstrong & Bull, 2006). It collects information on physical activity participation in three settings (Activity at work, travel to and from places, recreational activities) as well as sedentary behavior, comprising 16 questions. Physical activity was categorized as low or recommended (less or more than 150 min/week of moderate-intense and/or 75 min/week of vigorous-intense aerobic physical activity), as suggested by the WHO (2010).

The SPPB (Guralnik et al., 1994) includes:

- Standing balance. (a) Side-by-side stands: participants were asked to remain standing with their feet as close together as possible for 10 s; they scored 1 if the test was completed successfully, and 0 otherwise. (b) Semi-tandem test: participants were asked to remain standing with the ankle of one foot directly behind and in contact with the other for 10 s; they scored 1 if the test was completed successfully, and 0 otherwise. (c) Tandem test: participants were asked to remain standing with the ankle of one foot directly behind and in contact with the other foot for 10 s; they scored 0 if they remained in this position for ≤2 s, 1 for 3–9 s, and 2 for 10 s.
- Gait speed. Participants were asked to cover a distance of 4 m at their usual pace, and the time taken to do so was recorded. The use of a cane or walker was permitted. This test was completed twice and the shorter time was used for the analysis. The score