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Original article

Prevalence of sarcopenia and associated factors in institutionalised older adult patients

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SUMMARY

Background & aims: Sarcopenia is a syndrome characterised by a progressive and generalised loss of skeletal muscle mass and strength with a risk of adverse outcomes such as physical disability, poor quality of life and death. The main aim of the present study was to establish the prevalence of sarcopenia using EWGSOP-defined criteria in institutionalised older adult patients in long-term care institutions. A secondary purpose was to identify the risk factors that develop Sarcopenia in this population.

Methods: A Multicentre cross-sectional study was conducted in 334 institutionalised older adult patients, where the prevalence of sarcopenia and its relation with certain risk factors were measured. Physical performance was measured by gait speed, muscle strength measured by a handheld dynamometer and skeletal muscle mass measured using bioimpedance analysis. Different variables were collected: body mass index (BMI), diseases documented in the clinical record, the numbers of falls, the level of activity and functional ability.

Results: Two hundred eighty five individuals were included. According the EWGSOP algorithm and the cut-off points proposed by Masanes et al. for the Spanish population, 118 (41.4%) participants presented sarcopenia, of which 32 patients (27%) suffered from moderate sarcopenia, 78 patients (66%) were identified as severe sarcopenia patients and only 8 (7%) were classified as sarcopenic obesity. More female residents (96 females (81.4%) vs. 22 males (18.6%), $p < 0.0001$) tended to be sarcopenic. Patients diagnosed with sarcopenia tended to be more functionally impaired and had a more unfavourable BMI than those who were not sarcopenic (Barthel score 40.93 vs, 49.22, $p = 0.0034$ and BMI 23.57 vs, 27.61, $p < 0.0001$). Results from regression analysis indicated that those older than 85 years old (OR 2.495, 95% CI 1.401−4.441), the female gender, (OR 3.215, 95%CI 1.635−6.324) and whose BMI was lower than 22 (OR 5.973, 95% CI 2.932−12.165) appeared to be associated with sarcopenia, whereas the Barthel Index and other factors were not.

Conclusion: The present study suggests that sarcopenia is highly prevalent in patients living in long-term care institutions, especially in female patients. Our findings support that the muscle mass was negatively associated with poor nutritional status and poor capacity to develop basic activities of daily living that indicates high dependency of these patients and high necessity of care.

1. Introduction

In 1988, Irwin H. Rosenberg postulated that there may be no single feature of age related decline more striking than the decline in lean body mass affecting ambulation, mobility, energy intake, overall nutrient intake and status, independence and breathing. He proposed the term sarcopenia for this condition [1].

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Recently, a number of international organisations have been working to establish a consensus definition. Among these, the European Working Group on Sarcopenia in Older People (EWGSOP) has concluded that sarcopenia is a syndrome characterised by progressive and generalised loss of skeletal muscle mass and strength, with a risk of adverse outcomes such as physical disability, poor quality of life, and death. The diagnostic criteria established by EWGSOP require the presence of both low muscle mass and low muscle function (strength or performance). Primary sarcopenia results from ageing, whereas secondary sarcopenia may result from bed rest or sedentary lifestyle, chronic disease, multimorbidity, polypharmacy and/or nutrient deficiencies [2–4].

Sarcopenia increases the risk of falls and fractures, as well as the vulnerability to injuries, and, consequently, it can cause functional dependency and disability in the elderly [2,5,6]. Due to the increase in the risk of falls and fractures, sarcopenia is integrated in the elderly frailty syndrome and it is one of the main risk factors of disability and mortality in this population group [5,7].

Although the incidence of sarcopenia in institutionalised populations may be of high expectancy, few studies have been made using EWGSOP-defined criteria in long term care institutions and in these studies the prevalence of sarcopenia among older adults ranges from 17% to 32.8%, respectively [8,9]. This variability can be attributed to the different profile of the population studied and to the different methods used to assess sarcopenia. The main aim of the present study was to establish the prevalence of sarcopenia using EWGSOP-defined criteria in institutionalised older adult patients in long-term care institutions.

A secondary purpose was to identify the major associated factors to develop sarcopenia in this population.

2. Material and methods

2.1. Study design

We conducted a multicentre cross-sectional study to measure the prevalence of sarcopenia in institutionalised older adult patients, living in nursing homes from the Regional Social Welfare Ministry from Community of Valencia, Spain. This study also examined the associated factors that may contribute to the development of sarcopenia, such as: chronic diseases (Chronic Obstructive Pulmonary Disease (COPD), heart failure, degenerative osteoarthritis, etc.), activity level, body mass index (BMI) and neurodegenerative disease. Some studies suggest that chronic diseases listed above are associated to sarcopenia [2].

This study was conducted and evaluated by a multidisciplinary team of pharmacists, dieticians, physicians and physiotherapists, who are members from the Pharmacy Services and Nursing Homes from the Regional Social Welfare Ministry.

For this study, every patient (n = 334) was recruited from 4 nursing homes. The study was carried out from May 2013 to December 2014.

The inclusion criteria comprised all the patients institutionalised in the nursing homes that didn't have an acute disease at the moment of analysis. All the patients had at least one chronic disease. The presence of chronic disease was consulted in the clinical history of each patient.

The exclusion criteria were:

- Patients with terminal illness
- Patients wearing a pacemaker
- Patients with edema that could alter the BIA results. An increased amount of total body water and in particular of extracellular water may result in an underestimation of the body fat and overestimation of fat-free mass [9].The edema was assessed and diagnosed by the physician and recorded in clinical history.
- Voluntary renunciation
- Incapacity to carry out an order
- Amputation of any lower limb

Forty nine patients were excluded (14.7%). Reasons of exclusion are showed in Table 1.

Finally, two hundred eighty five individuals were included.

2.2. Measurements

These were the variables studied:

- Age and gender.
- Weight, Height and Body Mass Index (BMI). Weight was measured in each centre with its own scale and height was measured with a height rod. If height couldn't be obtained, we estimated height from ULNA length formula [10]. Different professionals took these measurements and this may lead to inter-individual errors. BMI lower than 22 kg/m^2 is considered at risk of malnutrition [11], and it's correlated with high risk of mortality [12].
- Diseases documented in the clinical record: heart diseases (heart failure), respiratory disease (COPD, respiratory failure), liver failure, kidney failure, endocrine diseases (Diabetes Mellitus, thyroid dysfunction), musculoskeletal disease (degenerative osteoarthritis), neurodegenerative diseases, cancer, chronic pain, pressure ulcers and malabsorption syndrome.
- Activity level: ambulant, walking using any walking aid, wheelchair, from bed to chair, or bedridden.
- Functional ability evaluation using Barthel index score [13]. Barthel index score is a 10-item ordinal scale that measures autonomy for basic activities of daily living (ADLs). Values less than 20 indicate total dependency for activities of daily living, and measures between 21 and 60 indicate severe dependence. It's validated in older population [14].
- Falls and number of falls in the last 3 months. Prediction of fall risk was collected using the Downton index [15]. The Downton index is a five-item scale that measures the fall risk, which are previous falls (yes/no), drug treatments that increase the risk of falls (such as tranquilizers, sedatives, diuretics, antiparkinsonians, etc.), presence of sensorial deficiency (visual or hearing impairment), mental state (conscious and oriented, confused or agitated), and level of wandering (bedridden or in a wheelchair, patients receiving care with walking aid, normal wandering). Depending on these variables, the prediction of fall risk can be classified as low, medium or high.
- Vitamin D supplementation intake during period of study.
- Number of hospital stays in the last 3 months.

The prevalence of sarcopenia has been determined using the diagnostic criteria for age-related sarcopenia from the European Working Group on Sarcopenia in Older People (EWGSOP), which

Table 1
Causes of exclusion.

Causes	Patients' number	Percentage (%)
Voluntary renunciation	10	20.41
Amputation of any lower limb	6	12.25
Presence of edema	11	22.45
Wearing a pacemaker	2	4.08
Not carry out an order	13	26.53
Terminal illness	5	10.20
Others	2	4.08

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