Sarcopenia in the Elderly

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In the 21st century, life expectancy has increased and consequently so has the number of elderly people. Sarcopenia is an emerging area in geriatric medicine. The European Working Group on Sarcopenia in Older People (EWGSOP) defined sarcopenia as a syndrome characterised by progressive and generalised loss of skeletal muscle mass and strength and/or physical performance, associated with a risk of adverse outcomes such as physical disability, poor quality of life, and death. Sarcopenia requires diagnostic and interventional methods in order to initiate timely and appropriate treatment. Diagnosing sarcopenia requires assessments of muscle mass, muscle strength and physical performance. Management of sarcopenia involves a variety of approaches. Nutritional and exercise interventions are strongly supported.

Keywords

Sarcopenia, elderly, ageing, protein, exercise

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Definition and Classification

Sarcopenia, an age-related loss of muscle mass and power, was recently recognised as a disease and received an International Classification of Diseases (ICD)-10 code M62.84 (September 2016).[1] The European Working Group on Sarcopenia in Older People (EWGSOP) defined it as a syndrome characterised by a progressive loss of skeletal muscle mass and strength associated with a risk of impairment, poor quality of life, and death.[2] The EWGSOP classified sarcopenia as primary, which is age related; and secondary, which includes sarcopenia related to physical inactivity (after prolonged bed rest, low physical activity, sedentary lifestyle), diseases (advanced organ failure, inflammatory, malignancy and endocrinopathy) and nutrition (inadequate diet, malabsorption, gastrointestinal disorders and drug-induced anorexia).

Diagnosis

Two criteria are needed for the diagnosis: low muscle mass and strength and/or low physical performance (decrease of muscle power and functionality) using proper measurements and tests.[2] The gold standard measurement for muscle mass is the dual energy X-ray absorptiometry (DXA) method, which has a low cost, is easy to apply and is also reliable. It measures the skeletal muscle mass of the four limbs, and thus the appendicular skeletal muscle mass (ASMM) can be calculated. ASMM, as measured by the DXA, is helpful in diagnosing sarcopenia. A value representing patient measurement is necessary to study ASMM, therefore sarcopenia can be defined by one of the following: ASMM/height² or skeletal muscle mass index (SMI) in weight per metre squared (kg/m²). Subjects with a SMI less than two standard deviation (SD) below the mean SMI of a reference young population were considered sarcopenic.[2] In the New Mexico Elders Aging Study database, the sarcopenia limit for men and women was 7.26 kg/m² and 5.45 kg/m², respectively.[3]

The SMI measurement does have some disadvantages; for example, the need for a whole body DXA device and the threshold, which is defined from the ratio ASMM/height² calculated less than 2 compared to the normal value for the average young adult of each study, which often differ. Other disadvantages are the results in obese and thin subjects (thin people with low muscle mass without any mobility limitation versus obese people with high muscle mass and mobility limitations) and the concept that muscle mass is the most important clinical parameter, which is wrong because strength and gender are not taken into consideration. Among measurements to assess muscle strength, it is necessary to emphasise the importance of handgrip strength. Even if the lower limbs are more relevant than the upper limbs in physical function, the strength of isometric handgrip has been widely used. Measured under standard conditions with a well-studied model of hand dynamometer, it is closely correlated with the lower limb muscle power and with the area of the calf section. Using a standardised and calibrated hand dynamometer, this correlates with the lower limb muscle power and with the area of the calf section.[4]

The timed get-up-and-go test (TGUG) is a performance measurement that evaluates dynamic equilibrium by measuring the time required to complete a series of tasks (getting up from a chair, walk a short distance, turn around, go back and sit down again).[5] Another test is the Short Physical Performance Battery (SPPB), which is one of the most validated techniques to measure physical performance.[6] It consists of a short battery of tests designed to evaluate the functionality of the lower limbs. This battery is composed of three different sections. The first is the assessment of balance in three tests: a) maintenance of the walk with feet-together position for 10 seconds; b) semi-tandem position for 10 seconds (big toe side to the heel bone), and c) tandem position again for 10 seconds (toe behind the heel). The second section is designed to assess the gait speed of 4 meters linear. The third section investigates the ability and the time taken to perform the sit to stand five consecutive times, without the aim of upper limbs.[7]

However, it is possible to diagnose sarcopenia in daily clinical practice. The SARC-F questionnaire includes five components, including strength, assistance walking, rise from a chair, climb stairs and falls.[7] The SARC-F scale scores range from 0 to 10 (i.e., 0–2 points for each component: 0=best to 10=worst in total score) and are categorised to represent symptomatic (4+) versus healthy (0–3) status. This questionnaire is globally validated.[8]

Management of sarcopenia in the elderly

One of the interventions for the prevention and treatment of sarcopenia is nutrition. It has been proven that older adults probably need 1.0–1.2 gr/kg protein intake per day. Creatine supplements, high vitamin D levels and other nutrients under investigation may provide further help.[9] The second important intervention is exercise, especially resistance exercise. Resistance-type exercise increases muscle strength and mass, which leads to improved physical performance. In order to stimulate muscle hypertrophy and increase strength, exercising at a low speed concentric and eccentric to each muscle for 2–3 seconds is safe, feasible and effective. Aerobic exercise appears good against sarcopenia as well because it increases mitochondrial energy production, insulin sensitivity and reduces oxidative stress.[10] However, the effective activity depends on proper nutrition.

Nowadays, there is an attempt to design medicines for sarcopenia prevention and treatment.[11] The anabolic hormone testosterone increases muscle mass, power, force and function, but can have very serious adverse effects, such as water retention, increase of hematocrit, worsening of sleep apnoea, increasing frequency of cardiovascular accidents and prostate events. Many other drugs are being tested in clinical trials to attempt to prove efficiency and safety in elderly population. This is a work in progress.[12] ❑

1. Anker SD, Morley JE, von Haehling S. Welcome to the ICD-10 code for sarcopenia. *J Cachexia Sarcopenia Muscle*. 2016;7:512–4.
2. Cruz-Jentoft AJ, Baeyens JP, Bauer JM, et al. European Working Group on Sarcopenia in Older People. Sarcopenia: European consensus on definition and diagnosis: Report of the European Working Group on Sarcopenia in Older People. *Age Ageing*. 2010;39:412–23.
3. Baumgartner RN, Koehler KM, Gallagher D, et al. Epidemiology of sarcopenia among the elderly in New Mexico. *Am J Epidemiol*. 1998;147:755–63.
4. Saggini R, Carmignano SM, Cosenza L, et al. Rehabilitation in sarcopenic elderly, frailty and sarcopenia. In: Dionyssiotis Y, *IntechOpen*, DOI: 10.5772/intechopen.69638. Available from: www.intechopen.com/books/frailty-and-sarcopenia-onset-development-and-clinical-challenges/rehabilitation-in-sarcopenic-elderly (Accessed: 1 August 2018)
5. Podsiadlo D, Richardson S. The timed 'Up & Go': A test of basic functional mobility for frail elderly persons. *J Am Geriatr Soc*. 1991;39:142–8.
6. Dionyssiotis Y, Kapsokoulou A, Samlidi E, et al. Sarcopenia: From definition to treatment. *Hormones (Athens)*. 2017;16:429–39.
7. LIFE Study Investigators, et al. Effects of a physical activity intervention on measures of physical performance: Results of the lifestyle interventions and independence for Elders Pilot (LIFE-P) study. *J Gerontol A Biol Sci Med Sci*. 2006;61:1157–65. Erratum in: *J Gerontol A Biol Sci Med Sci.* 2007;62:337.
8. Malmstrom TK, Morley JE. SARC-F: a simple questionnaire to rapidly diagnose sarcopenia. *J Am Med Dir Assoc*. 2013;14:531–2.
9. Dionyssiotis Y, Chhetri JK, Piotrowicz K, et al. Impact of nutrition for rehabilitation of older patients: Report on the 1st EICA-ESPRM-EUGMS Train the Trainers Course. *European Geriatric Medicine*. 2017;8:183–90.
10. Saggini R, Carmignano SM, Cosenza L, et al. Sarcopenia in Chronic Illness and Rehabilitative Approaches, Frailty and Sarcopenia. *IntechOpen*. DOI: 10.5772/intechopen.70223. Available at: www.intechopen.com/books/frailty-and-sarcopenia-onset-development-and-clinical-challenges/sarcopenia-in-chronic-illness-and-rehabilitative-approaches (accessed 2 November 2018).
11. Campins L, Camps M, Riera A, et al. Oral drugs related with muscle wasting and sarcopenia. A review. *Pharmacology*. 2017;99:1–8.
12. Yoshimura Y, Wakabayashi H, Yamada M, et al. Interventions for treating sarcopenia: a systematic review and meta-analysis of randomized controlled studies. *J Am Med Dir Assoc*. 2017;18:553.e1-553.e16