

## Sarcopenia in a healthy Italian elderly population.

Barnaba L, Ciarapica D, Zaccaria M, Polito A\*

Council for Agricultural Research and Economics, Research Centre for Food and Nutrition, Rome, Italy

\*Correspondence to: Polito Angela, Council for Agricultural Research and Economics, Research Centre for Food and Nutrition, Rome, Italy, Tel: +39-6-51494512; E-mail: angela.polito@crea.gov.it

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### Perspective

Sarcopenia is a syndrome characterized by progressive and generalized loss of skeletal muscle mass and strength associated with the risk of adverse outcomes such as physical disability, poor quality of life and death [1]. Sarcopenia is considered a key component of the elderly's frailty [2]. In 2010 the European Working Group on Sarcopenia in older People (EWGOP) developed a practical clinic definition and consensus criteria for age-related sarcopenia [1]. For the older people, it is very important to keep a healthy life because declining strength reduces the capacity to carry out essential activities of daily life and puts the elderly at risk for falls and loss of independence. Therefore, it is fundamental to understand if sarcopenia and the decline of muscle mass are a consistent risk for disability and death. Furthermore, several studies have shown a relationship between sarcopenia and osteoporosis, highlighting the association between muscle weakness and low bone density [3]. The close correlation between these two diseases suggested the utilization of a single diagnosis, defined as osteosarcopenia or sarco-osteoporosis [4,5].

To assess sarcopenia and the relationship between muscle mass with muscle strength and body mineral density we have studied 132 subjects (66 men, age 74 ± 4 years, BMI 26.4 ± 2.4 kg/m<sup>2</sup>; 66 women, age 74 ± 4 years, BMI 25.2 ± 2.9 kg/m<sup>2</sup>) according to the following inclusion/exclusion criteria [6]. Inclusion criteria: Men and women aged 70-87 years with a Body mass index between 20 and 30 kg/m<sup>2</sup>, a score >23 for mini mental

state examination test and >5 for Geriatric Depression scale and negative serology for HIV and hepatitis C. Exclusion criteria: smokers (>10 g tobacco/day), alcohol consume >30 g/day for men and >20 g/day for women, unusual dietary habits (vegetarians, vegans), use of mineral supplement during the 3 preceding months, assumption no more than four drugs/day, use of antidepressants, laxatives, hormonal replacement therapy, pathological diseases (cancer, diabetes, insufficient renal and hepatic performance, malabsorption and inflammatory chronic pathologies). Muscular strength was measured using hydraulic Hand Dynamometer (Jamar, Lafayette Instrument Co). Physical performance was assessed using by Short Physical Performance Battery (SPPB) [7]. Whole body and regional body composition, the muscular appendicular mass (ASM) and bone mineral density (BMD) were estimated by using Dual Energy X-ray Absorptiometry (DXA) (Model Hologic QDR 4500 W, software version 8.26a). Skeletal muscle mass index (SMI) was calculated by the ratio between muscular mass appendicular (ASM) and height to the square (m<sup>2</sup>) [8]. Sarcopenia was assessed according the method described by the European Working Group on Sarcopenia in older people [1]. The present study is a part of the European project named 'Zinc Effects on Nutrient/nutrient Interactions and Trends in Health and ageing (ZENITH)' that involved late middle-aged individual of both sex recruited in four different centers (Clermont-Ferrand, Theix (France), Coleraine (Northern Ireland), Grenoble (France), Rome (Italy) [6]. Data presented here are referred only to the Italian sample at baseline.

Table 1. Handgrip strength and body mineral density in different tertiles of skeletal muscle mass index (SMI).

	Low tertile SMI (kg/m <sup>2</sup> ) 4.98-6.72	Medium tertile SMI (kg/m <sup>2</sup> ) 6.73-7.69	High tertile SMI (kg/m <sup>2</sup> ) 7.70-9.71	p*
Handgrip Strength (kg)	23.16 ± 4.15	31.10 ± 7.80	37.32 ± 8.24	0
Body Mineral Density (BMD) g/cm <sup>2</sup>	0.96 ± 0.13	1.05 ± 0.13	1.17 ± 0.14	0

Sarcopenia was present in 9% of the sample, especially in women (7.5%) compared to men (1.5%). Severe sarcopenia is present in only 1.5% of subjects, while 10% of men present a pre-sarcopenia form, characterized by low muscle mass without a measurable impact on muscle strength or physical

performance. Muscle strength was higher in men than in women both in absolute value (+36%, p=0.0000) and after standardization for body weight (+20%, p=0.0000) or for Fat Free Mass (FFM) (+12%, p<0.005). Significant correlations were found between handgrip strength and SMI (r=0.68,

$p < 0.0000$ ) and BMD ( $r = 0.47$ ,  $p < 0.00000$ ), as well as between SMI and BMD ( $r = 0.59$ ,  $p < 0.00000$ ). The classification of the subjects according to tertiles of SMI identified an increasing muscular strength and bone density from the lower tertile to the upper tertile with a significant difference associated to the increase in muscle mass (Table 1).

In conclusion, the results of this study showed that Italian old men have stronger grip strength than women confirming literature data [9]. Moreover, our results confirm the presence of a relationship between muscle strength, and bone and muscle mass [10-12], indicating that high muscle mass is an important determinant for the prevention of the negative healthy outcomes associated with the loss of bone density associated to ageing. Several factors are responsible for the decline of muscle mass and strength, such as genetics, physical inactivity, smoking and alcohol consumption, inflammation, age associated hormonal declines, inadequate macro- and micronutrient intake [13-15] suggest that multicomponent lifestyle interventions, involving the combination of exercise and nutrition is the best way to preserve muscle mass and to protect the elderly population from osteopenia, osteoporosis and fragility. Moreover, many possible interactions (anatomic, chemical and metabolic) between bone and muscle are hypothesized [16]. The study of these relationships and the factors associated with sarcopenia is essential for continued development of standardized diagnostic and treatment options, which will lead to better care and quality of life for geriatric population.

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