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EDITORIAL

Sarcopenic obesity: a hot yet under considered evolving concept

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Sarcopenic obesity (SO) is the concomitant presence of sarcopenia plus obesity. The term was first described by Heber et al. in 1996 [1] and first operationally defined by Baumgartner in 2000 [2]. In this first operational definition, sarcopenia component was considered as low skeletal muscle mass (a muscle mass index < mean-2 standard deviations of the sex-specific reference for a young, healthy population). Davison et al. defined SO using anthropometrics and bioelectrical impedance [3]. In evolution of sarcopenia, recently, muscle strength became the key characteristics (sine qua non) of sarcopenia diagnosis [4]. As such, contemporarily, SO definitions are based on muscle strength.

Sarcopenic obesity (SO) concept has been a hot concept in recent years with subsequent accumulating researches. As discrete concepts, sarcopenia is related to increased morbidity and mortality in all individuals and obesity in young adults and in some older adults [5–9]. Their co-presence have customarily been assumed to exert an additive effect on the adverse outcomes, such as disability/functional impairments, metabolic impairments, co-morbidities, such as osteoarthritis, type 2 diabetes, cancer mortality, quality of life and health-related costs [10]. Various researches have supported this theory [11, 12]. In opposite to custom belief, there are other studies reporting sarcopenia alone (pure sarcopenia) may be harmful to the individual while obesity may attenuate adverse consequences of concomitant sarcopenia and hence, may exert a more favorable profile in older adults [10, 13].

SO has been defined in different ways in accordance with the integrated definition of sarcopenia and obesity. As such, a broad range of SO prevalence has been reported, ranging between 2.1 and 12% [10, 13]. To date, there has been a lot discussion focused on the way of its definition and applied diagnostic method as well. Each approach possesses its own pros and cons. As a cornerstone in its history, at the 26th year of introduction of the SO, term the European Society for Clinical Nutrition and Metabolism (ESPEN) and the European Association for the Study of Obesity (EASO) compromised on a very recent consensus to yield the very first consensus operational definition and diagnostic criteria for SO [14]. This is a significant step because this will aid in speaking the same language among researches and enable comparison and interpret several study findings.

In this ESPEN/EASO SO consensus [14], at-risk individuals were recommended to be should screened with 'body mass index (BMI)' or 'waist circumference' for obesity, and with 'consideration of risk factors and clinical symptoms', or 'validated questionnaires' for sarcopenia. In case of positive SO screening, the recommended diagnostic methods are assessment of skeletal muscle function (with preferably handgrip strength) at first. Following positive low muscle strength finding, the assessment of body composition by use of dual-energy X-ray absorptiometry (DXA) or bioelectrical impedance analyzer (BIA) is recommended to confirm or exclude low muscle mass with 'total or appendicular skeletal muscle mass (SMM) adjusted for body weight" and excess adiposity with 'fat mass percentage' parameter. As for staging, stage 1 is defined as SO with no accompanying clinical complications and stage 2; as SO+ complications. In addition, the group preferred to provide available cut-offs for recommended parameters. They suggested that that age, sex and ethnicity specific cut-offs are required [14].

While evaluating low muscle mass of sarcopenia, rather than the absolute muscle mass, muscle mass adjusted for body size is required. Body size of an individual is determined by the height and weight components. Indeed, skeletal muscle mass (SMM) adjusted for height square has been the usual method to assess low muscle mass (skeletal muscle

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mass index, SMMI). Nonetheless, SMMI (height^2) underestimates low muscle mass in obese individuals because gain in overall weigh goes in parallel with gain in muscle mass [15, 16]. This harmony is maintained by gravity stimulating the mechanoreceptors in muscle that amend the production of growth factors [17]. Hence, when the weight component of the muscle mass is not considered in an obese individual, muscle mass adjusted by height^2 will fail to recognize relative inadequacy of the skeletal muscle mass for that level of body weight. The consensus group recommended use of SMM adjusted by weight [SMMI (weight)]. Considering the determination of body size not only with body weight but height as well, one can suggest that adjustment of muscle mass shall be better to be performed by weight and height together, i.e., body mass index (BMI). Regarding this view, SMM adjusted for BMI has been shown as associated with functionality, physical performance or frailty much better than SMM adjusted by height^2 or weight [18]. Comparative studies will clarify this issue in the coming years and will be important contributions to the evolving definition of SO.

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Compliance with ethical standards

Conflict of interest There are no relationships/conditions/circumstances that present a potential conflict of interest.

Ethical approval This article does not contain any studies with human participants or animals.

Informed consent For this type of study, formal consent is not required.

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