



LETTER

Sarcopenic Obesity: Definition, Health Consequences and Clinical Management

Marwan El Ghoch^{1,2,*}, Simona Calugi² and Riccardo Dalle Grave²

¹*Department of Nutrition and Dietetics, Faculty of Health Sciences, Beirut Arab University, P.O. Box 11-5020 Riad El Solh, Beirut, Lebanon*

²*Department of Eating and Weight Disorders, Villa Garda Hospital, Via Montebaldo, 89, 37016 Garda, Verona, Italy*

Received: July 19, 2018

Revised: September 19, 2018

Accepted: September 22, 2018

Abstract: Over the last decade, a new condition, which occurs in the presence of both sarcopenia and obesity, has been termed “sarcopenic obesity”. The term describes the coexistence of obesity, defined as the increase in body fat mass deposition, and sarcopenia, defined as the reduction in lean mass and muscle strength. However, many uncertainties still surround the condition of sarcopenic obesity in terms of its definition, the adverse short- and long-term health effects (*i.e.*, medical disease, psychosocial functioning, quality of life and mortality) and its clinical management. The aim of this short communication is to emphasize some crucial aspects that future research should take into account in order to avoid bias and misinterpretations and to underline that the study of sarcopenic obesity should be considered a scientific and clinical priority, as reported by the European Society for Clinical Nutrition and Metabolism (ESPEN) and the European Association for the Study of Obesity (EASO).

Keywords: Obesity, Sarcopenic obesity, Body lean mass, Muscle strength, Morbidity, Medical disease.

1. INTRODUCTION

The term sarcopenia was initially used to refer to an age-related progressive loss of lean mass and muscle strength [1], known to be associated with morbidity, reduction in quality of life, frailty disability and increased rates of mortality. With the increasing prevalence of obesity worldwide [2], a new condition, which occurs in the presence of both sarcopenia and obesity, has been termed “sarcopenic obesity” [3]. However, many uncertainties still surround this phenomenon with regard to the definition, the potential “negative effects” on health (*i.e.*, medical diseases, psychosocial impairment) and the clinical implications and usefulness in terms of its treatment.

The aim of this short communication is to emphasize some crucial aspects that future research should take into account in order to avoid bias and misinterpretations and to underline that the study of this condition should be considered a scientific and clinical priority, as reported by the European Society for Clinical Nutrition and Metabolism (ESPEN) and the European Association for the Study of Obesity (EASO). In doing so, the following questions should be addressed:

- I. What is the definition of sarcopenic obesity?
- II. Is sarcopenic obesity harmful to health?
- III. Is this condition worth treating?

2. DEFINITION OF SARCOOPENIC OBESITY

Over the last decade, the clinical definition and diagnostic criteria for sarcopenia have been developed and both are

* Address correspondence to the author at the Department of Eating and Weight Disorders, Villa Garda Hospital Montebaldo, 89I-37016 Garda (VR), Italy, Tel: +39-045-8103915, Fax: +39-045-8102884; E-mail: marwan1979@hotmail.com

now widely accepted and recognized by the international scientific community [4]. However, no consensus has yet been reached on how to define sarcopenic obesity. In most studies, the definition of sarcopenic obesity has relied on body composition phenotypes (*i.e.*, lean mass) [4 - 7], low muscle strength (*i.e.*, weak handgrip strength) and poor physical performance (*e.g.*, slow walking) [4, 6, 7] cut-offs, usually used for the definition of sarcopenia in elderly people [4]. However, without accounting for body mass (*i.e.*, body mass index, body surface), definitions of sarcopenia in obesity that are based only on lean mass and physical fitness may be strongly skewed for at least two reasons. Firstly, patients with obesity tend to have a relatively large lean mass. Hence, sarcopenia criteria based on this parameter may not be met in these individuals and the prevalence of sarcopenia may, therefore, be greatly underestimated [8]. Secondly, low physical fitness is more strongly associated with obesity than with sarcopenia [9], with the result that the prevalence of sarcopenia may be overestimated.

To address this problem, recent reports have recommended accounting for body mass or body fat mass when identifying individuals with sarcopenic obesity [8]. In light of this recommendation, a new definition of sarcopenic obesity has been established, which in addition to the Appendicular Lean Mass (ALM) also includes the Body Mass Index (BMI) [10]. The following cut-offs have been proposed: ALM/BMI <0.804 in males and <0.582 in females [11]. Despite this progress, a lot of work is still needed to reinforce the concept of a suitable definition of sarcopenic obesity in order to avoid false positives and negatives. This issue is of extreme importance as the correct identification of sarcopenic obesity is fundamental to target interventions only on those patients that are really affected by this condition [12] (Fig. 1).

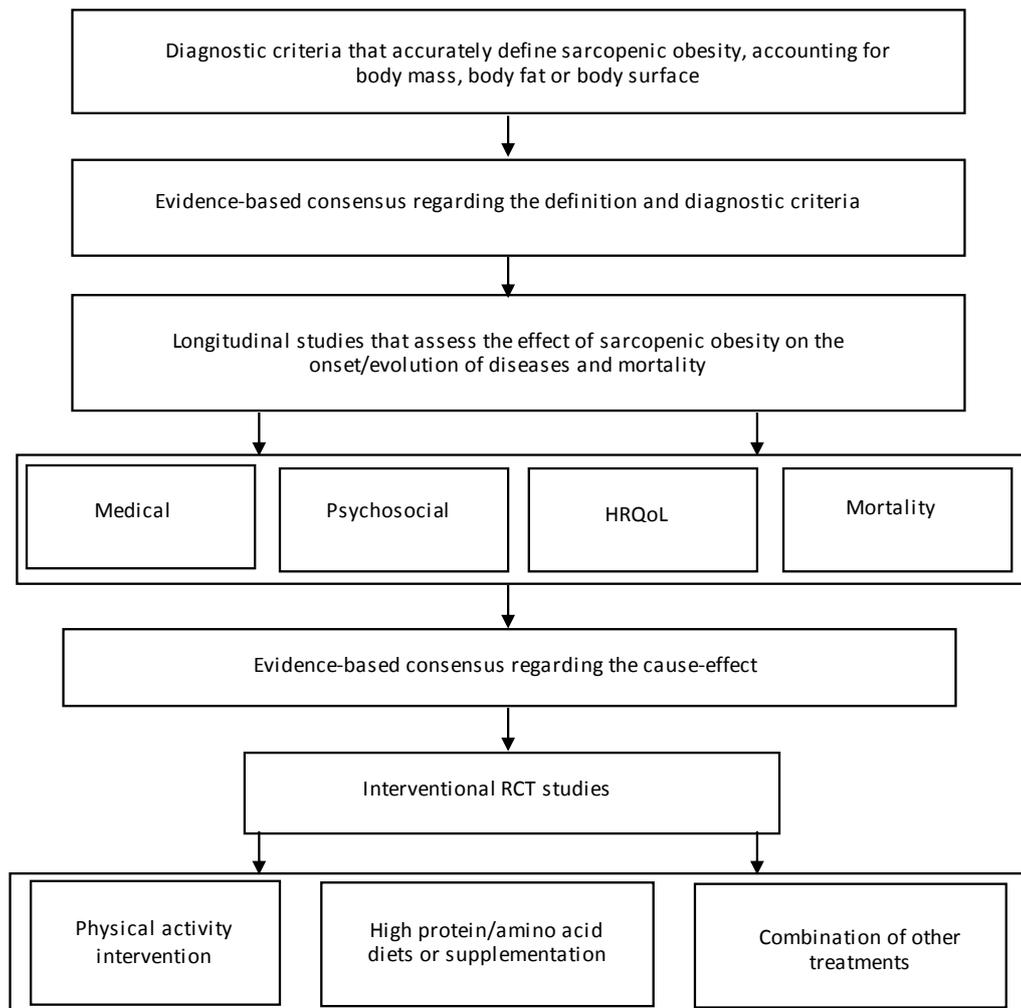


Fig. (1). Suggested approach to the study the sarcopenic obesity.

3. HEALTH CONSEQUENCES OF SARCOPENIC OBESITY

It has been hypothesized that the two components of sarcopenic obesity, namely obesity and sarcopenia, may synergistically increase their negative effects on health [13]. Indeed, several cross-sectional studies have demonstrated that individuals with sarcopenic obesity have a worse cardio-metabolic risk (*i.e.*, hyperglycaemia, hypertension, dyslipidaemia and insulin resistance) [5], psychological profiles (*i.e.*, depression and cognitive performance) [14] and impaired health-related quality of life (HRQoL) [15]. However, the cross-sectional design used in these studies indicates, at best, only simple associations between sarcopenic obesity and some health parameters but does not provide solid information regarding any causal relationships between the two conditions [16]. In other words, these studies are not able to determine if sarcopenic obesity may lead to the onset or deterioration of certain diseases since very few studies have longitudinally investigated the “real” effects of sarcopenic obesity on health. Moreover, the available studies have only assessed intermediate outcomes, (*i.e.*, glucose and lipid metabolism, metabolic disorders) and not hard long-term outcomes, (*i.e.*, mortality). These shortcomings of the research indicate the need to design longitudinal studies to clarify the real effect of sarcopenic obesity on the onset/evolution of certain diseases (*i.e.*, cardio-metabolic, psychological) in the short and medium-terms, as well as the risk of mortality in the long-term.

4. TREATMENT STRATEGIES OF SARCOPENIC OBESITY

After having reached a consensus on a valid definition of sarcopenic obesity and its real effect on health and mortality, the final step is to identify potential treatment strategies (*e.g.*, physical activity interventions, high-protein diets, protein supplements, *etc.*) and to use powerful randomized controlled trials to test their efficacy in limiting sarcopenia deterioration in patients with obesity. This is in line with the recommendation endorsed by the European Society for Clinical Nutrition and Metabolism (ESPEN) and the European Association for the Study of Obesity (EASO), entitled “*Sarcopenic obesity: Time to meet the challenge*”, This recommendation suggests that this condition should be considered a scientific and clinical priority for both researchers and clinicians [17].

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Not applicable.

HUMAN AND ANIMAL RIGHTS

No Animals/Humans were used for studies that are base of this research.

CONSENT FOR PUBLICATION

Not applicable.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

ACKNOWLEDGEMENTS

Declared none.

REFERENCES

- [1] Malafarina V, Uriz-Otano F, Iniesta R, Gil-Guerrero L. Sarcopenia in the elderly: Diagnosis, physiopathology and treatment. *Maturitas* 2012; 71(2): 109-14. [<http://dx.doi.org/10.1016/j.maturitas.2011.11.012>] [PMID: 22153348]
- [2] Afshin A, Forouzanfar MH, Reitsma MB, *et al.* Health effects of overweight and obesity in 195 countries over 25 Years. *N Engl J Med* 2017; 377(1): 13-27. [<http://dx.doi.org/10.1056/NEJMoa1614362>] [PMID: 28604169]
- [3] Zamboni M, Mazzali G, Fantin F, Rossi A, Di Francesco V. Sarcopenic obesity: A new category of obesity in the elderly. *Nutr Metab Cardiovasc Dis* 2008; 18(5): 388-95. [<http://dx.doi.org/10.1016/j.numecd.2007.10.002>] [PMID: 18395429]
- [4] Cruz-Jentoft AJ, Baeyens JP, Bauer JM, *et al.* Sarcopenia: European consensus on definition and diagnosis: Report of the european working group on sarcopenia in older people. *Age Ageing* 2010; 39(4): 412-23. [<http://dx.doi.org/10.1093/ageing/afq034>] [PMID: 20392703]
- [5] Stenholm S, Harris TB, Rantanen T, Visser M, Kritchevsky SB, Ferrucci L. Sarcopenic obesity: Definition, cause and consequences. *Curr*

- Opin Clin Nutr Metab Care 2008; 11(6): 693-700.
[<http://dx.doi.org/10.1097/MCO.0b013e328312c37d>] [PMID: 18827572]
- [6] Fielding RA, Vellas B, Evans WJ, *et al.* Sarcopenia: An undiagnosed condition in older adults. Current consensus definition: Prevalence, etiology, and consequences. International working group on sarcopenia. *J Am Med Dir Assoc* 2011; 12(4): 249-56.
[<http://dx.doi.org/10.1016/j.jamda.2011.01.003>] [PMID: 21527165]
- [7] Chen LK, Liu LK, Woo J, *et al.* Sarcopenia in asia: Consensus report of the asian working group for sarcopenia. *J Am Med Dir Assoc* 2014; 15(2): 95-101.
[<http://dx.doi.org/10.1016/j.jamda.2013.11.025>] [PMID: 24461239]
- [8] Johnson Stoklossa CA, Sharma AM, Forhan M, Siervo M, Padwal RS, Prado CM. Prevalence of sarcopenic obesity in adults with class II/III obesity using different diagnostic criteria. *J Nutr Metab* 2017; 2017: 7307618.
[<http://dx.doi.org/10.1155/2017/7307618>] [PMID: 28421144]
- [9] Bouchard DR, Dionne IJ, Brochu M. Sarcopenic/obesity and physical capacity in older men and women: Data from the nutrition as a determinant of successful aging (NuAge)-the quebec longitudinal study. *Obesity (Silver Spring)* 2009; 17(11): 2082-8.
[<http://dx.doi.org/10.1038/oby.2009.109>] [PMID: 19373219]
- [10] Studenski SA, Peters KW, Alley DE, *et al.* The FNIH sarcopenia project: Rationale, study description, conference recommendations, and final estimates. *J Gerontol A Biol Sci Med Sci* 2014; 69(5): 547-58.
[<http://dx.doi.org/10.1093/gerona/glu010>] [PMID: 24737557]
- [11] Batsis J, Mackenzie TA, Lopez-Jimenez F, *et al.* Prevalence of sarcopenic obesity using FNIH criteria in the US population: NHANES 1999-2004. *The Gerontological Society of America* 2015. 1
- [12] Bouchonville MF, Villareal DT. Sarcopenic obesity: How do we treat it? *Curr Opin Endocrinol Diabetes Obes* 2013; 20(5): 412-9.
[<http://dx.doi.org/10.1097/01.med.0000433071.11466.7f>] [PMID: 23974769]
- [13] Atkins JL, Wannamethee SG. The effect of sarcopenic obesity on cardiovascular disease and all-cause mortality in older people. *Rev Clin Gerontol* 2015; 25: 86-97.
[<http://dx.doi.org/10.1017/S0959259815000076>]
- [14] Hamer M, Batty GD, Kivimaki M. Sarcopenic obesity and risk of new onset depressive symptoms in older adults: English longitudinal study of ageing. *Int J Obes* 2015; 39(12): 1717-20.
[<http://dx.doi.org/10.1038/ijo.2015.124>] [PMID: 26122029]
- [15] Choi KM. Sarcopenia and sarcopenic obesity. *Korean J Intern Med (Korean Assoc Intern Med)* 2016; 31(6): 1054-60.
[<http://dx.doi.org/10.3904/kjim.2016.193>] [PMID: 27809450]
- [16] Solem RC. Limitation of a cross-sectional study. *Am J Orthod Dentofacial Orthop* 2015; 148(2): 205.
[<http://dx.doi.org/10.1016/j.ajodo.2015.05.006>] [PMID: 26232823]
- [17] Barazzoni R, Bischoff SC, Boirie Y, *et al.* Sarcopenic obesity: Time to meet the challenge. *Clin Nutr* 2018; S0261-5614(18)30169-9.
[PMID: 29857921]