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A New Challenge in Treatment of Sarcopenic Obesity in Older Adults: A Systematic Review

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Abstract

Introduction: Sarcopenic obesity (SO) defined as a phenotype of coexistence of sarcopenia, is an age-related loss of muscle mass and strength or physical performance, and obesity. It is crucial to determine the best management strategy for sarcopenic obese patients in order to improve life expectancy. The goal of this review is to provide an overview of sarcopenic obesity treatment for older persons. **Methods**: PubMed searches were conducted for 'sarcopenic obesity treatment' and 'sarcopenic obesity elderly treatment' from a database through the past 10 years. All articles available in English identified by these searches were then reviewed in detail **Result**: At present, the optimal treatment of sarcopenic has not been established. Nutritional interventions, such as a hypocaloric diet, and exercise training or physical therapy are the mainstay of SO prevention and treatment to achieve changes in body composition (muscle gain and fat reduction) and improve the functional status and quality of life of elderly patients. **Conclusion**: To further our understanding of SO, it is essential that clinicians and researchers establish a universal consensus for the definition and diagnosis of SO and focus on SO treatment and promote healthy aging.

Keywords: sarcopenic obesity, elderly, treatment

BACKGROUND

The current definitions of sarcopenic obesity are based on the individual definitions of sarcopenia and obesity. In 2010, the European Working Group for the Study of Sarcopenia (EWGSOP) required the presence of both low muscle mass and low muscle function (strength or performance) for the diagnosis of sarcopenia. The EWGSOP has developed a suggested algorithm for sarcopenia screening using a gait speed of <0.8 m/s before the measurement of muscle mass or strength.[1] The International Working Group for the Study of Sarcopenia provided a consensus definition for sarcopenia: namely, the combination of low appendicular lean mass and poor physical functioning (gait speed <1 m/s).[2]

Obesity is a chronic metabolic disease characterized by an increase in body fat stores that consequently elevates the risk of metabolic diseases, CVD, and mortality. As with sarcopenia, a consensus is currently lacking regarding the appropriate cutoff points for obesity. The World Health Organization (WHO) uses BMI to define obesity (≥30 kg/m2) and overweight (25–29.9 kg/m2). The American Association of Clinical Endocrinology recommends the use of the WHO body fat thresholds for the diagnosis of obesity (>25% in men and >35% in women). The amount of abdominal fat is easily assessed using waist circumference (WC), which is highly correlated to intra-abdominal fat content. The WHO also used WC thresholds (men: ≥102 cm and

women: ≥88 cm) as a surrogate for visceral fat.[3]

The prevalence of SO increases with age and it is estimated that more than one-tenth of the elderly population suffer from SO globally. This has important public health consequences as SO is associated with frailty, falls, disability, and increased morbidity and mortality, and places a heavy burden on individuals, society, and the medical system. Therefore, it is important to know the management of sarcopenic obesity in order to improve the quality of life of the elderly.

Since it was first introduced, the main treatment for sarcopenic obesity has not been widely defined. Several previous studies have found it difficult to provide therapy or advice to patients with sarcopenic obesity. The choice of whether an elderly person only needs activity with sports or requires dietary adjustments or medication is still being debated. The goal of this review is to provide an overview of sarcopenic obesity treatment for elderly.

METHODS

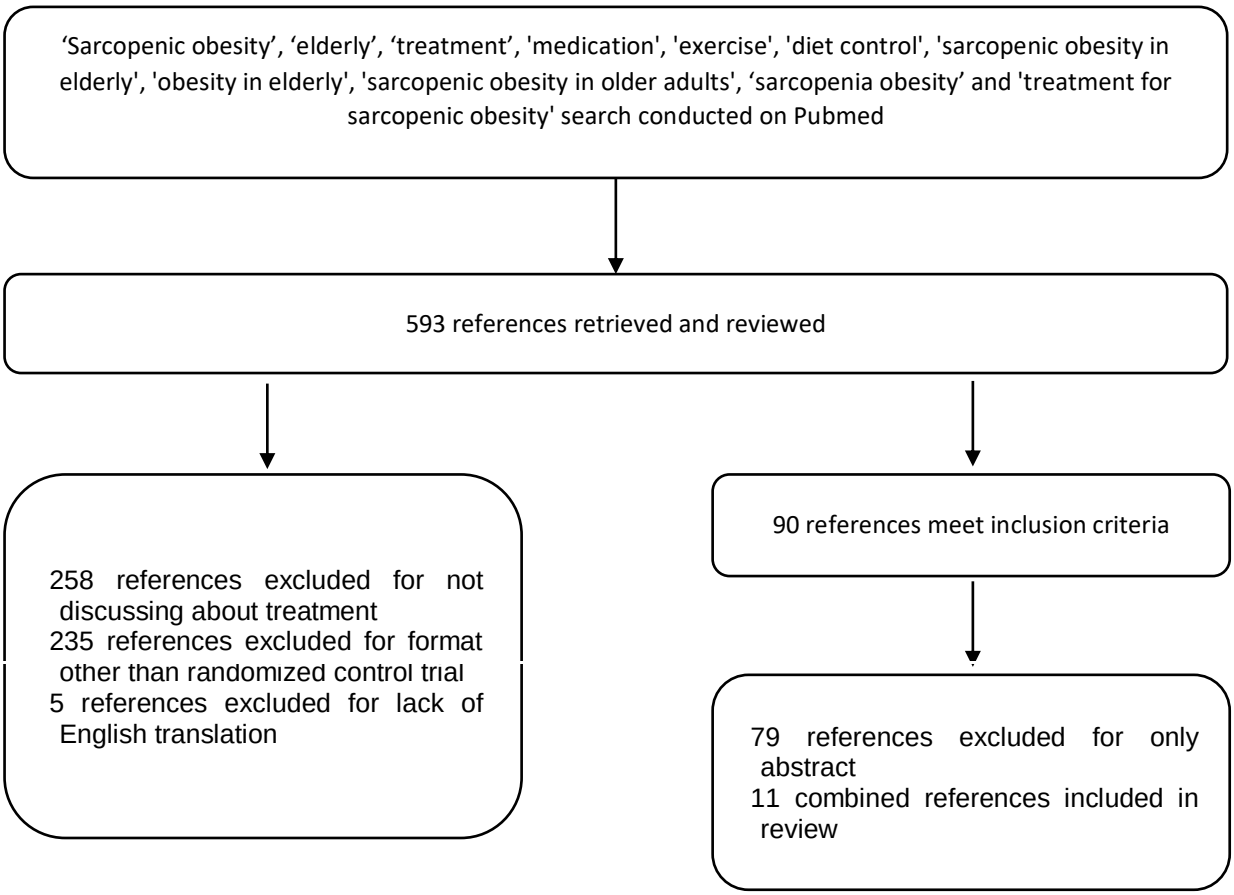
Search strategy and eligibility criteria

PubMed searches were conducted for ‘sarcopenic obesity’ AND ‘elderly’ AND ‘treatment’ from a database for the last 10 years. Other keywords used to assist the search were 'randomized control trial', 'medication', 'exercise', 'diet control', 'sarcopenic obesity in elderly', 'obesity in elderly', 'sarcopenic obesity in older adults', ‘sarcopenia obesity’ and 'treatment for sarcopenic obesity'. All articles identified by these searches were reviewed if the article text was available in English. The inclusion criteria used were full papers that could be accessed, articles in English, using a randomized control trial method, which were studies within the last 10 years (2014 to 2023). Exclusion criteria were papers in the form of abstracts or preliminary control trials, studies in the form of reviews, cross-sectionals, cohorts, or case reports, and studies on animals or tests on cells.

A total of 593 articles were found using the keywords previously mentioned. Based on these results, the authors conducted data collection and obtained 90 references according to the previous inclusion criteria. About 503 references were excluded with details of 258 because they did not discuss management, 235 because they were not randomized control trials, and 5 because no English translations were found. Of the 90 references, 73 articles were not found in the full paper, so they were not included in the research analysis.

Data synthesis and analysis

The following were tabulated for each case: author, year study, age sample, total sample, and result. All time is presented as ‘years’ including year study and age sample. In terms of results, articles are divided again based on the type of therapy given to sarcopenic obesity patients, namely whether exercise, dietary adjustments, or the use of certain medications. Researchers display the results in the form of narrative and in the form of tables.


'Sarcopenic obesity', 'elderly', 'treatment', 'medication', 'exercise', 'diet control', 'sarcopenic obesity in elderly', 'obesity in elderly', 'sarcopenic obesity in older adults', 'sarcopenia obesity' and 'treatment for sarcopenic obesity' search conducted on Pubmed
593 references retrieved and reviewed
258 references excluded for not discussing about treatment
235 references excluded for format other than randomized control trial
5 references excluded for lack of English translation
90 references meet inclusion criteria
79 references excluded for only abstract
11 combined references included in review

RESULT

At present, the optimal treatment of sarcopenic has not been established. Nutritional interventions, such as a hypocaloric diet, and exercise training or physical therapy are the mainstay of SO prevention and treatment to achieve changes in body composition (muscle gain and fat reduction) and improve the functional status and quality of life of elderly patients. We found a total of 11 references which can be divided into 6 references discussing exercise, 3 references discussing diet or medication and 2 references discussing a combination of both.

Exercise

Research related to the treatment of sarcopenic obesity using exercise has been widely discussed in the form of randomized control trials. We found 6 studies from 2017 to 2021 which are shown in table 1. In general, all studies used regular exercise, such as using resistance training, to overcome sarcopenic obesity. Four studies by Diel et al., Huang et al., Liao et al., and Banitalebih et al., state that the use of elastic band resistance can be more helpful in improving the physical function of the elderly and improving the quality of life of the elderly. Research by Chen, Diel et al., and Villareal states that a combination of resistance training and aerobic training also helps in overcoming sarcopenic obesity. Only one study by Villarreal suggested weight loss may help the functional status of obese older adults

Diet or Medication

Research that only discusses dietary patterns or certain types of food in overcoming sarcopenic obesity is rare. Research by Kemmler in 2020 and 2018 states that the combination of giving whole body electromyostimulation and consuming high-protein foods can help overcome sarcopenic obesity which is safe for the kidneys. A study by Espinoza in 2021 shows that giving oxytocin can help increase muscle mass accompanied by a decrease in fat mass so that it can be effective in the elderly with sarcopenic obesity.

Combination of Exercise and Diet

Only two studies discussed the combination of diet and exercise but these two studies showed significant results in helping to overcome sarcopenic obesity. In this study by Kim (2016) and Nabuco (2019) stated that diet helps in increasing muscle mass and exercise helps reduce fat mass. This combination also helps improve physical function and improve the quality of life of the elderly.

DISCUSSION

Sarcopenic obesity has been appropriately characterized as a confluence of two epidemics, namely the aging of the population and the obesity epidemic. It is characterized by obesity with decreased muscle mass and function, with a prevalence as high as 20% in older populations.[4] Indeed, older adults are particularly susceptible to the adverse effects of excess body fat on physical function because of

1) decreased muscle mass and strength that occurs with aging (sarcopenia) and 2) a need to carry greater body mass due to obesity. This increasingly prevalent phenotype has given rise to a population of older adults at increased risk for disability, institutionalization, and mortality. While these sequelae are widely recognized as inherent to obesity in older adults, it is now accepted that the combination of obesity with sarcopenia, a change in body composition typical of aging, poses even greater risks for poor health-related outcomes and disability than either obesity or sarcopenia alone.[5]

In this study we suggest treatment for sarcopenic obesity be based primarily on lifestyle interventions. Sarcopenic obesity has been attributed in part to an age-related decline in physical activity, an observation which has prompted several studies on the effects of exercise on this disorder. In the findings of this article, Chen et al in 2017 stated that activities in the form of resistance training and aerobic training greatly affect muscle mass and reduce total fat mass compared to those who do not. This is supported by a study by Diel et al in 2018 which found reduced body mass index, insulin, IGF-1, leptin and adiponectin in sarcopenic obesity patients who did resistance and aerobic training.

We recommend a combination of exercise and nutrition as treatment for sarcopenic obesity. Study by Kim shows that the greatest decrease of body fat mass was in the exercise and nutrition or diet group at 5.5% (P =0.036);

Table 1. Research on Sarcopenic Obesity and Exercise

Author	Age sample	Diagnosis method	Result	Citation
Chen 2017	68,5	Sarcopenic obesity index	Resistance training (RT), aerobic training (AT) or combination training (CT) demonstrated increased muscle mass and reduced total fat mass and visceral fat area (VFA) compared with those without training. The muscle strength performance and serum IGF-1 level in trained groups, especially in the RT group, were superior to the control group	[6]
Diel 2018	53 ± 10.4	Body mass index (BMI) >25.0 kg/m2 (or body fat 30%) and waist circumference 88 cm and appendicular skeletal mass index	Combined resistance and aerobic exercise effectively attenuated metabolic syndrome, sarcopenic obesity, and relevant biomarkers in an ethnically diverse sample of sedentary, overweight, or obese. Sarcopenic obesity (appendicular skeletal mass index, P = .001; body mass index, P = .001) and circulating biomarkers, including insulin (P = .002), IGF-1 (P = .001), leptin (P = .001), and adiponectin (P = .001), were significantly improved post intervention compared with usual care.	[7]
Huang 2017	68,8 ± 4.9	Skeletal muscle mass index and percentage of body fat	Progressive elastic band resistance exercise can reduce fat mass and increase BMD in elderly women with SO, and that this exercise program is feasible for this demographic.	[8]
Liao 2017	66.4 ± 4.5	Skeletal muscle mass and percentage body fat	Elastic resistance exercise exerted benefits on the body composition, MQ, and physical function in patients with sarcopenic obesity. Regular exercise incorporating elastic RET should be used to attenuate muscle mass loss and prevent physical difficulty in obese older adults with sarcopenia on reconditioning therapy.	[9]
Villareal 2017	70 ± 5	Body mass index, Physical Performance Test	Weight loss plus combined aerobic and resistance exercise was the most effective in improving functional status of obese older adults.	[10]
Banitalebi 2021	64.1 ± 3.8	Fat mass index, appendicular lean mass index, body mass index, fat-free mass index, skeletal muscle mass, and total body fat	12-weeks of elastic band resistance training causes a slight and insignificant improvement in osteoporosis markers in women affected with Osteosarcopenic Obesity.	[11]

		percentage		

Table 2. Research on Sarcopenic Obesity and Diet or Medication

Author	Age sample	Diagnosis method	Result	Citation
Kemmler 2020	78.1 ± 1.9	Skeletal muscle mass index (SMI) and body fat recommendation.	The combination of whole-body electromyostimulation (WB-EMS) with a high-protein intake revealed no short-term, negative impact on the eGFR	[12]
Kemmler 2018	77.1 ± 1.6	Skeletal muscle mass index (SMI) and body fat recommendation.	Moderate-high dosed whey protein supplementation, especially when combined with WB-EMS, may be a feasible choice to address obesity and cardiometabolic risk.	[13]
Espinoza 2021	68.3 ± 5.8	Body mass index and slow gait speed	Oxytocin led to a significant increase of 2.25 kg in whole body lean mass compared with placebo (P < .01) with a trend toward decreasing fat mass, and a significantly reduced plasma LDL cholesterol by 19.3 mg/dL (P ¼ .023) compared against placebo. There were no significant changes in BMI, appetite scores, glycemia, plasma HDL, triglycerides, or depressive symptoms.	[14]

Table 3. Research on Sarcopenic Obesity and Combination Exercise and Diet

Author	Age sample	Diagnosis method	Result	Citation
Kim 2016	80.9 ± 4.2	Body fat percent of 32% or greater, combined with skeletal muscle mass index less than 5.67 kg/m2.	The exercise and nutrition interventions were over four times as likely (odds ratio [95% confidence interval]) to reduce body fat mass than the health education group (4.42 [1.21-16.19]; 4.50 [1.13-17.9], respectively). Significant odds ratios of the exercise and nutrition intervention improving walking speed (3.05 [1.01-9.19]), vitamin D (14.22 [1.64-123.02]), and leptin (3.86 [1.19-12.47]) were also observed.	[15]
Nabuco 2019	68.0 ± 4.2	Body fat mass ≥35% combined with appendicular lean soft tissue (ALST) less than <15.02 kg	Whey protein combined with RT increased ALST, and decreased total and trunk fat mass, improving sarcopenia and decreasing SO in older women, with a limited impact on inflammation.	[16]

Although no additive effects for the combination of exercise and nutrition could be confirmed.[15] Another study by Nabuco shows that using whey protein (WP) and resistance training promotes greater increases in ALST and greater decreases in total, relative and trunk fat mass. It has been suggested that 30-35 g of WP is required to allow appropriate stimulation of postprandial muscle protein synthesis in older individuals. In addition, WP is a fast protein to digest, promoting rapid release of amino acids into the bloodstream, leading to a more pronounced stimulation of muscle protein synthesis rate during the first few hours following ingestion.[16]

The use of Whole Body Electromyostimulation (WB-EMS) has been widely mentioned as one of the newest therapeutic methods for sarcopenic obesity. The WB-EMS equipment enables the simultaneous activation of both lower and upper legs, both upper arms, bottom, abdomen, chest, lower back, upper back, and latissimus dorsi with selectable intensity for each region. Bipolar electric current was applied with a frequency of 85 Hz and an impulse width of 350 µs intermittently with 4–6 s of EMS simulation using a direct impulse boost and 4 s of rest. The length of the session was progressively increased up to 20 min after 8 weeks.[17]

CONCLUSION

In conclusion, the combination of exercise and nutrition effectively improved body fat, blood components, and physical function. The use of high protein such as whey protein diet is recommended to help increase muscle mass and using exercise such as resistance training or aerobic training also recommended. To further our understanding of SO, it is essential that clinicians and researchers establish a universal consensus for the definition and diagnosis of SO and focus on SO treatment and promote healthy aging.

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