IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

IMPACT OF SARCOPENIA ON ELDERLY ATHLETE AND NON ELDERLY ATHLETE

MOHAN KUMAR C. S

College Director of Physical Education

Maharani's Arts College for Women, Mysore, Karnataka, India

Abstract:

Sarcopenia is a condition characterized by loss of skeletal muscle mass and function. Although it is primarily a disease of the elderly, its development may be associated with conditions that do not exclusively affect the elderly. Sarcopenia is a syndrome characterized by a progressive and generalized loss of skeletal muscle mass and strength that is closely associated with physical disability, poor quality of life, and death. Risk factors for sarcopenia include age, sex, and level of physical activity. In conditions such as malignancy, rheumatoid arthritis, and aging, lean body mass is lost while fat mass is maintained or even increases. The loss of muscle mass may be accompanied by an increase in body fat, resulting in marked weakness despite normal weight, which is called sarcopenic obesity. There is a strong association between inactivity and loss of muscle mass and strength, suggesting that physical activity should be a protective factor for the prevention, but also for the treatment of sarcopenia.

In addition, one of the first steps to take in a person with sarcopenia or clinical frailty is to ensure that the sarcopenic patient receives proper and adequate nutrition. Sarcopenia has a greater impact on survival. It should be important to prevent or delay the onset of this condition as much as possible to improve survival and reduce the need for long-term care. Interventions for sarcopenia need to be developed, with emphasis on exercise and nutrition.

Keywords: Sarcopenia, Epidemiology, Weakness, Sarcopenic Obesity.etc.,

Introduction:

Interest in sarcopenia, the age-related loss of skeletal muscle mass and function, is growing considerably. In 1989, Rosenberg proposed the term 'sarcopenia' (Greek 'sarx' for flesh + 'penia' for loss) to describe this age-related decrease in muscle mass. Although sarcopenia is primarily a disease of the elderly, its development can be associated with conditions that are not exclusive to the elderly, such as physical inactivity, malnutrition, and cachexia. Like osteopenia, it can also occur in younger patients, such as those with inflammatory diseases. Muscle accounts for 60% of the body's protein stores. Decrease in muscle mass is directly responsible for functional impairment with loss of strength, increased likelihood of falls, and loss of independence. Sarcopenia still lacks a universally accepted clinical definition, uniform diagnostic criteria, ICD-9 (International Classification of Diseases 9th Revision) codes, and treatment guidelines. One of the most important recent developments has been the convergence in the operational definition of sarcopenia. Sarcopenia is a syndrome characterized by progressive and generalized loss of skeletal muscle mass and strength and is associated with the risk of adverse outcomes such as physical disability, poor quality of life, and death. The three consensus papers that published a definition of sarcopenia were written under the auspices of the European Working Group on Sarcopenia in Older People (EWGSOP), the European Society for Clinical Nutrition and Metabolism Special Interest Groups (ESPEN-SIG) (11), and the International Working Group on Sarcopenia (IWGS).

The consensus definitions were as follows:

- The presence of low skeletal muscle mass and either low muscle strength (e.g., handgrip and lifting the weight) or low muscle power (e.g., Running, walking speed or muscle strength); when all three conditions are present, severe sarcopenia may be diagnosed (EWGSOP).
- The presence of low skeletal muscle mass and muscle strength (which can be measured by walking/running speed) (ESPEN-SIG)
- The presence of low skeletal muscle mass and low muscle function (which can be assessed by walking/jogging speed); and "that [sarcopenia] is associated with a loss of muscle mass alone or in conjunction with increased fat mass" (IWGS). Thus, by separating muscle strength from muscle power, the EWGSOP consensus allows a somewhat broader definition and provides a classification of a severe condition.

In addition, the diagnosis of sarcopenia can be made by assessing the following parameters:

1. Measurement of walking/running speed in the elderly (> 65 years). If walking/running speed is less than 0.8 m/s on the 4-m walk test, measure muscle mass. A low muscle mass is a percentage of muscle mass divided by the square of height, is less than two standard deviations of the normal adolescent mean (> 7,23 kg/m2 and in women at > 5.67 kg/m2), as defined by Dual Energy X-Ray Absorptiometry.

2. If walking/running speed on the 4-m walk/run test is greater than 0.8 m/s, handgrip strength should be tested; if this value is less than 20/25 kg for women and 30/40 kg for men, muscle mass should be analyzed as previously described.

EWGSOP published guidelines in 2010 that set specific parameters to identify sarcopenia. EWGSOP proposes a conceptual classification into 'pre-sarcopenia," 'sarcopenia,' and 'severe sarcopenia." The 'pre-sarcopenia" stage is characterized by low muscle mass with no effect on muscle strength or physical performance. This stage can only be detected with techniques that measure muscle mass accurately and in relation to a standard population. The 'sarcopenia' stage is characterized by low muscle mass and low muscle strength or physical performance. severe sarcopenia is the stage in which all three criteria in the definition are met (low muscle mass, low muscle strength, and low physical performance). Recognizing stages of sarcopenia can help in selecting treatments and setting appropriate recovery goals. The EWG-SOP consensus also discussed the concept of frailty and its overlap with sarcopenia. It recognized, as have others, that frailty is characterized by deficits in multiple organ systems, i.e., psychological, cognitive, and/or social functioning, as well as physical limitations.

It is also important to distinguish sarcopenia from cachexia. The term cachexia is derived from the Greek words kakòs (bad) and héxis (condition). Cachexia can be defined as a multi factorial syndrome characterized by severe loss of body weight, fat, and muscle and increased protein catabolism due to one or more underlying diseases. Cachexia is clinically relevant because it increases patient morbidity and mortality. Factors contributing to the onset of cachexia include anorexia and metabolic alterations, i.e., increased inflammatory status, increased muscle proteolysis, and impaired carbohydrate, protein, and fat metabolism.

Epidemiology:

Sarcopenia increases from 14% in those over 65 but fewer than 70 to 53% in those over 80. Depending on the definition of sarcopenia used in the literature, the prevalence in 60 to 70 year olds is reported to be 5 to 13%, while the prevalence in people above 80 years of age ranges from 11 to 50%. The number of people aged greater than or equal to 60 years was estimated at 600 million worldwide in 2000, a number that is expected to increase to 1.2 billion by 2025 and 2 billion by 2050. Even with a conservative estimate of prevalence, sarcopenia affects 50 million people today > and will affect 200 million in the next 40 years >. The impact of sarcopenia on the elderly is far-reaching; its substantial utilities are measured in terms of

morbidity, disability, high health care costs, and mortality. Sarcopenia is both widespread and associated with serious health consequences in terms of frailty, disability, morbidity, and mortality. There has been an increase in longevity globally. According to the United Nations, the proportion of people above the age of 60 years is 13% at a global level and 8.6% in India.

Etiopathogenisis:

The mechanisms of sarcopenia are not clearly defined. Well-described risk factors for sarcopenia include age, sex, and level of physical activity and resistance training is particularly effective in slowing age-related skeletal muscle loss. In addition, sarcopenia is associated with important co morbidities such as obesity, osteoporosis, type-II diabetes, and insulin resistance. Perhaps, the strongest evidence that skeletal muscle loss, particularly muscle strength, is important, however, comes from the demonstration that it predicts future mortality in both middle-aged and elderly adults. In some individuals, a clear and single cause of sarcopenia can be identified. In others, no clear cause can be isolated. Therefore, the categories of primary sarcopenia and secondary sarcopenia may be useful in clinical practice. Sarcopenia may be termed 'primary' (or age-related) when no cause other than aging itself is apparent, whereas sarcopenia may be termed 'secondary' when one or more other causes are apparent. In many older people, the etiology of sarcopenia is multifactorial, so it may not be possible to characterize each person as primary or secondary. This situation argues for viewing sarcopenia as a multifaceted geriatric syndrome. In addition to external factors, inadequate energy and protein intake contribute to loss of muscle and function. Decreased intake of vitamin D has been associated with low functionality in the elderly. Acute and chronic comorbidities also contribute to the development of sarcopenia in the elderly. Comorbidities may lead to decreased physical activity and bed rest, on the one hand, and increased production of proinflammatory cytokines, which play an important triggering role in proteolysis, on the other. Individuals who have led an active lifestyle throughout their lives have more lean body mass and muscle mass in old age.

Sarcopenic Obesity:

In conditions such as malignancy, rheumatoid arthritis and ageing, lean frame mass is misplaced while fats mass can be preserved or even elevated. The loss in muscle groups may be related to expanded frame fat in order that in spite of everyday weight there is marked weakness, this is a circumstance called sarcopenic obesity. The relationship among age-associated reduction of muscle groups and power is frequently independent of body mass. It had long been notion that age-associated loss of weight, in conjunction with lack of muscle groups, was in large part liable for muscle weak spot in older human beings. But, it is now clean that modifications in muscle composition are also crucial, e.g. ‘marbling’, or fats infiltration into muscle, lowers muscle nice and paintings performance. With getting old, lean frame mass decreases, even as fats mass will increase preferentially inside the intra-belly location, even in exceedingly weight-stable, wholesome people. Weight problems and sarcopenia can also potentiate each other and act synergistically causing

physical impairment, metabolic disorders and mortality. Aging is often associated with chronic inflammatory conditions such as obesity, atherosclerosis, type 2 diabetes and insulin resistance. In older individuals, skeletal muscle protein synthesis is resistant to the anabolic action of insulin. Therefore, insulin resistance may be associated with age-related muscle loss. Inversely, loss of skeletal muscle, which is the largest insulin-responsive target tissue, may produce insulin resistance that promotes cardiovascular disease and other metabolic disorders, Sayer et al., reported that decreased grip strength was significantly associated with homoeostasis model assessment of insulin resistance as well as increased odds of having metabolic syndrome. Moreover, increases in visceral fat may lead to the augmented secretion of pro-inflammatory cytokines that may promote a catabolic effect on muscles, as well as insulin resistance. Recently, several studies have reported that inflammation may be directly associated with sarcopenia. Cesari et al., found that C-reactive protein (CRP) and interleukin-6 (IL-6) are positively associated with total fat mass and negatively associated with fat-adjusted appendicular lean mass. Moreover, Schaap et al., reported that TNF-a and its soluble receptors showed the most consistent associations with decline in muscle mass and strength. On the other hand, several previous studies have demonstrated that serum 25-hydroxyvita-min D (25[OH]D) levels are inversely correlated with various measures of obesity, including weight, Body Mass Index (BMI) and waist circumference. In addition, Visser et al., reported that lower 25[OH]D levels increase the risk of sarcopenia in older men and women. Low 25[OH]D levels may be associated with both sarcopenia and low physical activity. It has been proposed that excess energy intake, physical inactivity, low-grade inflammation, insulin resistance and changes in hormonal homeostasis may result in the development of sarcopenic obesity. It is now established that adipose tissue is an active endocrine organ that secretes hormones and cytokines that affect systemic inflammatory status. Either adipocytes or infiltrating macrophages in adipose tissue produce adipokines and proinflammatory cytokines, such as IL-6 and tumor necrosis factor-a, which induce the production of CRP in the liver. Honda et al. found that protein-energy wasting is common in overweight end-stage renal disease patients and is associated with inflammation. Furthermore, Stenholm et al., found that the combination of high body fat percentage and low hand grip strength is associated with increased levels of CRP. These results suggest inflammation has an important role in the development of sarcopenic obesity. Scott et al. observed that 25[OH]D may be important for the maintenance of muscle function and mass. In this study was found that 25[OH]D levels were positively associated with SMI in both sexes. Moreover, lower 25[OH]D levels were significantly associated with sarcopenic obesity in men even after adjusting for confounding factors. In another cross-sectional study of 2,208 subjects (aged 55 and older), low handgrip strength and walking limitation (<1.2 m/s or difficulty walking 500 m) were correlated with increased body fat. The researchers found that the prevalence of walking limitation was much higher in persons who simultaneously had a high body fat percentage and low handgrip strength (61%) than in those with a combination of low body fat percentage and high handgrip strength (7%) .

Sarcopenia as a risk factor:

Although sarcopenia itself is an adverse health outcome, it is also a risk factor for other adverse events. Sarcopenia increases the risk of physical limitation and subsequent disability; recent researches also show that this condition increases the risk of comorbid conditions. In a systematic review and meta-analysis of published (prospective) studies that had assessed physical capability (using measures such as grip strength, walking speed, chair rises, and standing balance) and subsequent outcome (including fracture, cognition, cardiovascular disease, hospitalization, and institutionalization), Cooper et al. found that those who demonstrated lower physical capability had a higher risk of negative outcomes. Furthermore, according to Fried et al., the loss of the muscle mass plays an important etiologic role in the frailty process of elderly subjects, being also a key player of its latent phase and explaining many aspects of the frailty status itself. Sarcopenia is frequently associated with poor endurance, physical inactivity, slow gait speed and decreased mobility. The age-related muscle mass loss is also associated with an increased risk of incident disability, all-cause mortality and higher health-care costs in the older people. Information on sarcopenia among community living older subjects and its relation to survival is still lacking. In a previous study, the muscle mass was demonstrated to be a predictor of overall mortality after a follow-up of 4 years. However, some recent studies suggested that muscle function may be a more powerful predictor of disability and mortality than the muscle mass. Indeed, sarcopenia, independent of its causes, may predict negative outcomes, such as falls and/or subsequent difficulty in instrumental and basic ADL. Furthermore, it has been associated with an increased risk of death, hospitalization, need for long-term care and higher health care expenditures. The evidence that sarcopenia has a greater effect on survival than other clinical characteristics is significant for clinical practice among old and frail older persons. The traditional medical model should move from a disease-centred perspective to a functioning-centred view. In this respect, the prevention of sarcopenia is one of the major goals of public health professionals and clinicians. There is an established link between inactivity and losses of muscle mass and strength, this suggests that physical activity should be a protective factor for the prevention but also the management of sarcopenia. Furthermore one of the first step to be taken for a person with sarcopenia or clinical frailty is to ensure that he or she is receiving correct and sufficient nutrition. Greater emphasis is needed, therefore, to prevent or postpone as much as possible the onset of sarcopenia among older people, to enhance survival and to reduce the demand for long-term care.

Conclusion:

Sarcopenia remains a crucial clinical problem that impacts lacs of millions of older adults. Reasons of this situation encompass declines regular activities, involving in adequate sporting event, in hormones and numbers of neuromuscular junctions, improved inflammation, declines in interest, and insufficient nutrients. There are a whole lot of situations correlated with sarcopenia like obesity, diabetes and reduced account of vitamin D, which has been proposed that excess electricity consumption, physical inactive, low grade

inflammation, insulin resistance and modifications in hormonal homeostasis may additionally result in the development of sarcopenic weight problems. The sarcopenia is highly correlated with frailty and danger of falls in elder; it additionally represents a critical threat aspect for incapacity and mortality. Consequently, sarcopenia has a greater effect on survival. Therefore to those evidences it needs to be vital to save you or put off as a good deal as possible the onset of sarcopenia amongst older humans, to beautify survival and to reduce the call for long-time period care. Interventions for sarcopenia continue to be advanced, the interest on the sarcopenia have to be increased, mainly via studying the impact of exercise and nutritional interventions. The prevalence of sarcopenia found in the present study was 14.2% in an elderly population (<60 years of age) and was more likely to occur in non athlete compared to athlete (24.5% vs 3.4%). Larger community-based surveys are required to determine the actual burden of the problem in India.

References:

1. Rosenberg I. Summary comments: epidemiological and methodological problems in determining nutritional status of older persons. Am J Clin Nutr. 1989;50:1231–3. [Google Scholar]

2. Rosenberg IH. Sarcopenia: origins and clinical relevance. J Nutr. 1997;127:990S–91S. [PubMed] [Google Scholar]

3. Schneider SM, Al-Jaouni R, Filippi J, Wiroth JB, Zeanandin G, Arab K, et al. Sarcopenia is prevalent in patients with Crohn's disease in clinical remission. Inflamm Bowel Dis. 2008;14:1562–8. [PubMed] [Google Scholar]

4. Janssen I, Heymsfield SB, Ross R. Low relative skeletal muscle mass (sarcopenia) in older persons is associated with functional impairment and physical disability. J Am Geriatr Soc. 2002;50:889–96. [PubMed] [Google Scholar]

5. Evans WJ. What is sarcopenia? J Gerontol A Biol Sci Med Sci. 1995;50(Spec):5–8. [PubMed] [Google Scholar]

6. Rosenberg I. Summary comments. Am J Clin Nutr. 1989;50:1231–3. [Google Scholar]

7. Roubenoff R. Origins and clinical relevance of sarcopenia. Can J Appl Physiol [PubMed] [Google Scholar]

8. Delmonico MJ, Harris TB, Lee JS, et al. Alternative definitions of sarcopenia, lower extremity performance, and functional impairment with aging in older men and women. J Am Geriatr Soc. 2007;55:769–74. [PubMed] [Google Scholar]

9. Goodpaster BH, Park SW, Harris TB, et al. The loss of skeletal muscle strength, mass, and quality in older adults: The health, aging and body composition study. J Gerontol A Biol Sci Med Sci. 2006;61:1059–64. [PubMed] [Google Scholar].