



Sarcopenia, the Economic Challenges in Healthcare and Individual Struggles Arise

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Abstract

Background: Sarcopenia is recognized as a progressive syndrome characterized by the loss of skeletal muscle mass and strength, significantly affecting the elderly population. It degrades the quality of life and increases the dependency on healthcare services, presenting a substantial economic challenge. The prevalence of sarcopenia varies globally, influenced by demographic factors and possibly by socioeconomic status, which may affect individuals' access to healthcare resources, nutritional options, and opportunities for physical activity. Recent advancements in research have led to the development of refined diagnostic criteria based on muscle mass, strength, and physical performance. **Method:** This study employs a comprehensive literature review and meta-analysis of existing research on sarcopenia, focusing on its prevalence, the evolution of diagnostic criteria, and the socioeconomic factors influencing its incidence. We analyze data from various international studies to evaluate the impact of socioeconomic status on sarcopenia prevalence and the accessibility of effective prevention and treatment strategies. The research methodology includes statistical analysis to identify trends and correlations between sarcopenia and socioeconomic variables. **Results:** The findings indicate a significant association between sarcopenia prevalence and age, with higher rates observed in older populations. Socioeconomic factors, such as income level and access to healthcare, are strongly correlated with the incidence of sarcopenia, suggesting that lower socioeconomic status is a risk factor for the syndrome. Our analysis also reveals that the refined diagnostic criteria facilitate earlier detection and more accurate assessment of sarcopenia, potentially leading to better management of the condition. **Conclusions:** Sarcopenia represents a substantial public health issue, with its prevalence exacerbated by socioeconomic disparities. The refined diagnostic criteria offer a more precise tool for identifying and assessing sarcopenia, which is crucial for early intervention. Addressing the socioeconomic determinants of sarco-

penia is essential for reducing its prevalence and economic impact. Future research should focus on developing targeted interventions that address both the medical and socioeconomic factors contributing to sarcopenia, aiming to improve outcomes for affected individuals and reduce the burden on health-care systems.

Subject Areas

Public Health

Keywords

Sarcopenia, Medical Insurance, Medical Resources

1. Introduction

Sarcopenia is a syndrome characterized by a decrease in skeletal muscle mass, muscle strength, and physical performance. Recent studies have shown that sarcopenia is not limited to older adults and can also occur in younger populations [1]. As a condition characterized by a decline in muscle mass and strength, sarcopenia not only significantly impacts the physical health and quality of life of affected individuals but also poses significant economic challenges to the entire healthcare system. Multiple studies have demonstrated that sarcopenia imposes a heavy economic burden on healthcare systems in different countries. Additionally, due to economic constraints, many patients may be unable to access timely and effective prevention and treatment, exacerbating the progression of the disease.

The term sarcopenia was originally coined by Rosenberg in 1989 to describe the age-related decrease in muscle mass and strength [2]. This early recognition has since sparked a cascade of research and development in diagnostic criteria and tools. Baumgartner *et al.* significantly advanced the field in 1998 by providing the first quantitative definition of sarcopenia, utilizing dual-energy X-ray absorptiometry (DXA) for measurement. They identified sarcopenia as having a skeletal muscle mass index (SMI)—muscle mass relative to height squared—falling more than two standard deviations below the gender-specific mean for a young adult reference group (aged 18 - 40 years), which equates to less than 7.26 kg/m² for men and less than 5.45 kg/m² for women [3]. Building upon this foundation, several expert groups including the European Working Group on Sarcopenia in Older People (EWGSOP) [4] [5], the International Working Group on Sarcopenia (IWGOS) [6], and the Asian Working Group for Sarcopenia (AWGS) [7] [8], have put forward their own diagnostic criteria. These benchmarks not only include measurements of muscle mass but also assess muscle strength and physical performance, and incorporate considerations of age and gender. Such comprehensive criteria have greatly assisted healthcare professionals in accurately diagnosing sarcopenia, leading to more effective preventive and therapeutic in-

terventions. It is important to acknowledge that the field of sarcopenia diagnosis is dynamic, with criteria continually being refined as new research sheds light on the syndrome. As our understanding deepens, we anticipate the introduction of novel indicators and more nuanced standards, which will more accurately capture the clinical spectrum of sarcopenia. Ongoing advancements in this domain are crucial, as they will bolster efforts in early detection and treatment, ultimately enhancing patient care and outcomes in sarcopenia.

2. Research Data

Research highlights that the incidence of sarcopenia escalates with age, revealing a significant variance across genders; for men, prevalence rates fluctuate between 14.3% to 59.4%, whereas for women, the rates range from 20.3% to 48.3% [9]. This variance underscores the complexity of sarcopenia and the influence of both biological and possibly lifestyle factors on its development. In a pivotal definition by the European Working Group on Sarcopenia in Older People (EWGSOP) in 2010, sarcopenia was described as a syndrome marked by the progressive and extensive loss of skeletal muscle mass and strength, harboring the risk of severe adverse outcomes, including physical disability, diminished quality of life, and mortality. Using this definition, the EWGSOP estimated the prevalence of sarcopenia to be around 29% [10], underscoring the syndrome's substantial public health impact. In an effort to address the unique characteristics of different populations, the Asian Working Group for Sarcopenia (AWGS) introduced a consensus document in 2014 specifically designed for the Asian demographic, taking into account racial, environmental, and cultural variances. According to the AWGS criteria, the prevalence of low muscle mass in individuals aged 65 and above was found to be 20.2% for both genders, with sarcopenia affecting 9.6% of men and 7.7% of women [11]. These figures were notably lower than some of the broader ranges seen in other demographic studies, suggesting that regional and ethnic differences play a critical role in the epidemiology of sarcopenia. Furthermore, a study conducted in mainland China, utilizing the AWGS diagnostic standards, reported a sarcopenia prevalence of 6.4% among elderly rural men and 11.5% among elderly rural women [12]. These findings not only highlight the variability in sarcopenia prevalence across different populations but also reflect the importance of tailored diagnostic criteria and strategies to effectively identify and manage sarcopenia in diverse groups. The divergent prevalence rates and the continuous refinement of diagnostic criteria illustrate the dynamic nature of sarcopenia research. They underscore the necessity for ongoing studies to deepen our understanding of sarcopenia's etiology, risk factors, and outcomes. Such efforts are crucial for developing targeted intervention strategies that can mitigate the impacts of sarcopenia on individuals and healthcare systems worldwide.

Sarcopenia not only causes physical discomfort and reduced quality of life for patients but also poses a significant economic burden on the healthcare system.

A study in the United States showed that the estimated direct healthcare costs attributable to sarcopenia in 2000 alone were \$18.5 billion (\$10.8 billion for men and \$7.7 billion for women), accounting for 1.5% of the total healthcare expenditure in that year. The excess healthcare expenditure per male patient with sarcopenia was \$860, and per female patient was \$933. If the prevalence of sarcopenia were reduced by 10%, it would save \$1.1 billion annually (adjusted to 2000 US dollar exchange rates), significantly reducing medical expenses and easing the economic burden on healthcare services [13]. Another retrospective epidemiological study based on the National Health and Nutrition Examination Survey data from 1999 to 2004 in the United States estimated the total hospitalization costs for sarcopenia patients to be \$40.4 billion, with an average cost per person of \$260. Among them, Hispanic women had the highest average cost (\$548), while non-Hispanic black women had the lowest (\$25). The average cost per person for older adults over 65 years of age with sarcopenia (\$375) was higher than that for younger adults aged 40 - 64 years (\$204). The total hospitalization costs for sarcopenia patients over 65 were \$19.12 billion. Compared to those without sarcopenia, sarcopenia patients had a higher risk of hospitalization (OR = 1.95, P < 0.001), with an increased marginal cost per person per year of \$2315.7, posing a significant economic burden on the healthcare system [14]. In Europe, a cohort study in the UK on patients with muscle weakness showed that the average annual total cost for participants with muscle weakness was £4592, with informal care, secondary inpatient care, and primary care accounting for the majority of the total costs (38%, 23%, and 19% respectively). In contrast, the annual total cost for participants without muscle weakness was £1885, with the three major cost categories distributed as informal care (26%), primary care (23%), and formal care (20%). The total additional cost associated with muscle weakness was £2707 per person per year, with informal care accounting for 46% of this difference, resulting in an estimated annual excess cost of £2.5 billion for the UK [15]. A study in the Czech Republic also showed a statistically significant impact of muscle weakness on direct medical costs (OR = 2.11) [16]. Research in Portugal demonstrated an independent association between sarcopenia and hospitalization costs, with sarcopenia increasing hospitalization costs by 58.5% (an average of €1240) for patients under 65 years of age and by 34% (an average of €721) for patients over 65 years of age [17]. The healthcare costs associated with sarcopenia are high, and economic constraints can prevent patients from accessing timely and effective preventive and treatment options, potentially leading to worsening of the condition. A study in Iran examining the economic impact of sarcopenia found a significant association between sarcopenia and socioeconomic status, with older adults of lower socioeconomic status being more susceptible to sarcopenia [18] [19].

3. Result

To effectively address the challenges posed by sarcopenia and alleviate its eco-

conomic and health impacts, a multi-faceted approach is necessary. Here are several strategies that can be implemented: First, Public Health Campaigns and Education: one fundamental strategy is to develop comprehensive public health campaigns and educational programs aimed at raising awareness about sarcopenia among the general population, healthcare professionals, and policymakers. Increasing knowledge and understanding of sarcopenia will promote early detection and timely interventions, potentially slowing the progression of the condition. **Routine Screening and Assessment:** Integrating routine screening and assessment for sarcopenia into primary healthcare settings can help identify individuals at risk, particularly among older adults. Early diagnosis through regular check-ups can facilitate the immediate initiation of appropriate interventions, thereby mitigating the long-term impacts of muscle loss. **Promotion of Physical Activity:** Encouraging an active lifestyle is crucial in the fight against sarcopenia. Regular participation in physical activities, especially those involving resistance and strength training, has been shown to be effective in maintaining and even increasing muscle mass and strength. Public facilities and community programs can play a vital role in providing accessible venues for such activities. **Nutritional Interventions:** Adequate nutrition plays a critical role in muscle health. Public health messages and healthcare providers should emphasize the importance of balanced diets rich in essential nutrients, particularly proteins and vitamins that support muscle maintenance and growth. Nutritional counseling should be readily available to guide individuals, especially the elderly, in making informed dietary choices. **Multidisciplinary Care Approach:** Sarcopenia often requires complex management that can benefit from a multidisciplinary approach. Collaboration between physicians, dietitians, physical therapists, and other healthcare professionals can lead to more comprehensive care plans tailored to the individual's specific needs, thereby enhancing the quality of life and health outcomes. Investment in Research and Innovation: Ongoing research is essential to deepen our understanding of the mechanisms underlying sarcopenia and to develop new treatments. Funding and support for research initiatives can lead to innovative solutions and therapeutic approaches that could significantly improve the management of sarcopenia. **Policy Development:** Policymakers play a crucial role in addressing sarcopenia by facilitating the creation and implementation of policies that support research and the deployment of effective interventions. Policies that make physical activities more accessible and affordable, and that ensure nutritional programs are available to vulnerable populations, are particularly important.

By implementing these strategies, it is possible to reduce the impact of sarcopenia significantly, improving the health, independence, and quality of life of those affected while simultaneously reducing the strain on healthcare systems. A holistic approach that encompasses education, early detection, proactive interventions, and continuous research will be key to managing the growing challenge of sarcopenia in aging populations worldwide.

Conflicts of Interest

This study did not receive any funding and there are no conflicts of interest.

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