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Research paper

Sarcopenia as a public health problem



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ABSTRACT

The importance of a health problem is based on its current and expected prevalence, its clinical and economic consequences, the social status of people affected by the problem and the availability of an effective treatment. In this paper, we review the main current literature on sarcopenia in order to assess whether this geriatric syndrome could be considered as a major public health problem. Our review highlights that based on its prevalence, its clinical consequences, the limitations of the current available treatments as well as on the fact that many frail patients are affected by this geriatric syndrome, sarcopenia should be considered as a health priority by all interested parties in order to reduce its burden.

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1. Introduction

From a public health point of view, the importance of a health problem is based on its current and expected prevalence, its clinical and economic consequences, the social status of people affected by the problem and the availability of an effective treatment.

Sarcopenia is a geriatric syndrome characterized by progressive and generalized loss of skeletal muscle mass and strength. Sarcopenia still has no broadly accepted clinical or operational definition, consensus diagnostic criteria or International classification of diseases codes. However, there is a growing interest of researchers in this field and various scientific societies have worked to enrich the knowledge to better manage patients suffering from this geriatric syndrome. The increased interest in sarcopenia is clearly seen by the increased number of publications published in the last few years [1].

The objective of this paper is to review the main current literature on the prevalence, the cost, the clinical outcome and the treatment of sarcopenia in order to assess whether this syndrome could be considered as a major public health problem. Computer-assisted searches of publications and reviews were conducted on Medline database to identify pertinent papers published until July 2014. We searched the database via the OVID system for

articles which included both MeSH and free-text terms related to sarcopenia and muscle outcomes. Relevant articles were selected by four researchers (OB, CB, ML and FB) based on their date of publication, originality and methodological quality.

2. Current and expected prevalence of sarcopenia

The term “sarcopenia” was firstly introduced by Irwin Rosenberg to characterize the abnormal age-related loss of muscle mass [2]. The definition of sarcopenia was then enriched with scientific and technological advances and gradually evolved to incorporate the notions of decreased muscle mass, then of decreased muscle function (low muscle strength or low physical performance) [3]. These definitions differ from each other in regards to muscle mass indicators (ratio of appendicular lean mass over height squared, ALM/ht², or over body mass index, ALM/BMI), the cut-off points for slow gait speed and whether or not they include a measure of weakness. The prevalence of sarcopenia observed in various research studies varies significantly. This also reflects the differences in population groups, the different methods used to measure skeletal muscle mass and size, and the differences in the normative (young and healthy) population groups that were used to derive sarcopenia thresholds [4]. Two recent systematic reviews have assessed the prevalence of sarcopenia. According to the first one, prevalence of sarcopenia was, with regional and age-related variations, 1–29% in community-dwelling populations, 14–33% in long-term care populations and 10% in the only acute

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hospital-care population [5]. Moreover, it should be pointed out that the prevalence is highly dependent on the tools used and the diagnostic cut-off limits [6,7]. Anyway, when considering all methods and diagnostic criteria, the second systematic review showed that the prevalence of sarcopenia in the elderly ranged from 0.0% to 85.4% in men and 0.1% to 33.6% in women [8].

Estimates by the World Health Organization showed that the number of people around the world aged ≥ 60 years was estimated at 600 million in the year 2000, a figure that is expected to rise to 1.2 billion by 2025 and 2 billion by 2050 [9]. Conservative estimates based on the prevalence of sarcopenia and on the World Health Organization population data suggest that sarcopenia affects more than 50 million people today, and that it will affect more than 200 million people over the next 40 years [10].

3. Clinical outcomes of sarcopenia

Sarcopenia is associated with many comorbidities which have a major impact on public health. It has been shown that sarcopenia coexists with osteoporosis and may increase fracture risk, either through a crosstalk between muscle and bone tissues and through an increase of risk of falling [11]. It should also be pointed out that most of endocrine diseases (diabetes, hypogonadism, hypercortisolism...) as well as obesity and chronic kidney disease are associated with sarcopenia, which may be an underlying mechanism by which chronic diseases cause physical disability [12].

Incident adverse outcomes are of primary importance when discussing the severity of a disease. Sarcopenia is itself an adverse outcome of ageing and of multiple diseases but is also a risk for other adverse events. Even if some sarcopenia related parameters (i.e. muscle mass, muscle strength or physical function) have been suggested to be significantly associated with incident disability [13], the interest should be better focused on the consequences of sarcopenia itself on incident adverse outcomes.

Sarcopenia is frequently mentioned as an important risk factor for falls in older persons but evidence from well-designed prospective studies is quite limited. For example, sarcopenic participants from an Italian cohort were over three times more likely to fall during a follow-up period of 2 years relative to non sarcopenic individuals, regardless of age, gender and other confounding factors [14]. This makes sense in regards to a systematic review and meta-analysis indicating that lower extremity weakness is a clinically important and statistically significant risk factor for falls [15].

Some studies have investigated the association between low muscle mass and mortality [16]. However, some other studies have suggested that muscle function may be a more powerful predictor of disability and mortality than the muscle mass alone [17,18]. In subjects aged 80 years and older followed over 7 years, it was shown that sarcopenia is associated with mortality, independently of age and other clinical and functional variables [19]. In a Mexican cohort of community dwelling individuals older than 70 years, subjects who were diagnosed as sarcopenic had 1.39 times more risk of dying independently of other known risk factors [20]. Similar observations were made in a Brazilian cohort showing an increased risk of death around 50% in subjects diagnosed with sarcopenia [21].

One would have thought the prediction of adverse outcome would depend on the definition of sarcopenia. However, a recent interesting paper showed that, when applied to a Chinese elderly population, criteria used for the diagnosis of sarcopenia, whether derived from European, Asian, or international consensus panels, all have similar performance in predicting incident physical limitation and mortality [22]. However, another study found some differences among the published definitions of sarcopenia in the prediction of falls [23].

Given the various impacts of sarcopenia on physical health, quality of life of subjects affected by this syndrome is very likely to be deteriorated. Besides potential problems with activities of daily living [24], some data on health related quality of life of sarcopenic subjects is now available. In a large Belgian cohort, a decrease in health related quality of life in the domain of physical function was found, using the Short Form (36) Health Survey (SF-36) questionnaire, in patients with sarcopenia (after adjustment for various confounding variables) [25]. However, for the other domains of the SF-36 questionnaire, for the EQ-VAS scale and for the EQ-5D (i.e. two standardised instruments for use as a measure of health outcome), no differences in the quality of life were found. In a UK cohort, a reduced quality of life in the domain of physical function and related to general health for sarcopenic subjects was also reported [26]. However, another small study did not report a significant difference in any dimensions of the SF-36 in sarcopenic patients compared to non-sarcopenic patients [27]. Anyway, most of these studies highlighted a reduced quality of life for physical function among sarcopenic subjects. However, we must pay attention to the limits of the use of generic quality of life questionnaires when assessing quality of life in sarcopenic subjects [28]. Only specific domains, such as mobility or physical function, are concerned in sarcopenia and a specific tool seems necessary to assess the real impact of sarcopenia on quality of life [29].

4. Costs of sarcopenia

There are very few data on the costs of sarcopenia. Up to now, no European economic data are available for sarcopenia but in the United States, the health care costs related to sarcopenia are estimated at about \$18.5 billion, being 1.5% of total health care expenditure [9]. A 10% reduction in sarcopenia prevalence in the US has been estimated to yield a saving of at least \$1.1 billion per year [9]. Given the expected prevalence of sarcopenia in the future and its clinical consequences, the cost of this geriatric syndrome is also expected to grow in the future [10].

5. Status of affected individuals

The importance of a disease in terms of public health is also related to the characteristics of the population affected by the problem. It can be more dramatic when the disease affects preferably frail or vulnerable individuals (i.e. with low education or low revenue, with concomitant comorbidities or during hospitalisation). Unfortunately, data are sparse on this topic. Nor the level of education or the civil status seems to be different between sarcopenic and non sarcopenic patients in most of the studies [14,19,20,22,25] even if a recent one showed an increased risk of sarcopenia in subjects with fewer years of education [30]. Severe cognitive impairments is more frequent in sarcopenic patients compared to controls [14,19,20,22,25,31]. Depression symptoms are reported more frequently by sarcopenic subjects in some but not all studies [14,19,22,25]. Most studies showed a higher number of concomitant diseases and drugs consumed in sarcopenic subjects compared to controls [19,25]. Sarcopenia is also frequently observed in hospitalised patients [31,32] or following major health problems such as a hip fracture [33] or a cardiovascular disease [34]. The impact of sarcopenia on cancer survival or following transplantation or after major surgeries has been understudied but should although be considered as a poor prognostic factor [35–37].

6. Treatment of sarcopenia

Sarcopenia is a multifactorial syndrome. Consequently, effective treatment should be based on a multimodal approach,

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