Review

Serum albumin and health in older people: Review and meta analysis

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ABSTRACT

Albumin is the most abundant plasmatic protein. It is only produced by the liver and the full extent of its metabolic functions is not known in detail. One of the main roles assigned to albumin is as an indicator of malnutrition. There are many factors, in addition to nutrition, that influence levels of albumin in plasma. The main aim of this review is to assess the clinical significance of albumin in elderly people in the community, in hospital and in care homes. Following the review, it can be stated that age is not a cause of hypoalbuminemia. Albumin is a good marker of nutritional status in clinically stable people. Significant loss of muscle mass has been observed in elderly people with low albumin levels. Hypoalbuminemia is a mortality prognostic factor in elderly people, whether they live in the community or they are in hospital or institutionalized. Low levels of albumin are associated to worse recovery following acute pathologies. Inflammatory state and, particularly, high concentrations of IL-6 and TNF-alpha, are two of the main influencing factors of hypoalbuminemia. In elderly patients with a hip fracture, albumin levels below 38 g/L are associated to a higher risk of post-surgery complications, especially infections. Further research is needed on the impact of nutritional intervention upon albumin levels and on the outcomes in elderly people in the community, in hospital and in care.

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1. Introduction

Ongoing population ageing will lead to a doubling of the number of people over 65, in the coming five decades. There is increasing evidence that caloric–proteic malnutrition is a widespread problem in this section of the population [1]. Nutritional assessment and treatment of malnutrition are imperative in order to attempt to minimize the risk of illness or complications associated to old age. Elderly people living in the community present the lowest incidence of malnutrition, whereas institutionalized elderly people are the most malnourished [2].

Malnutrition in the elderly can be multi-factorial, with negative consequences on most organs and systems [3].

Despite increasing scientific evidence that hepatic protein levels depend on other factors in addition to intake, these proteins continue being used to assess nutritional state and to diagnose malnutrition [4,5] (Fig. 1). The biological functions of albumin have not been comprehensively defined, but its inverse relation to mortality, to the development of complications and to mean length of stay in hospital for acute patients, is clear [6–8]. Procedures for measuring concentration of albumin in serum can be affected by the higher volume of distribution observed in patients in an acute phase [9].

For all these reasons, the main aim of this review is to assess published articles on the subject of albumin in elderly people in order to attempt to understand its relationship with age, its importance as a nutritional index and as a prognostic factor in the various geriatric clinical settings (the community, hospitals and care homes).

2. Search strategy

We searched PubMed for articles published until July 2014, in English, Italian and Spanish. We completed our search by revising the bibliographies of the articles included in our review. We used the following search terms and associations: albumin, hypoalb*, protein, elderly/older, nutr*, malnutri*, undernutri*, hospital*, hip fracture, community dwelling, nursing home/residen*/home care, function* outcome, complica*, mortality. We included research on people above 65 in which serum concentration of albumin was measured. The authors (SC and VM) solved doubts about inclusion criteria for the papers assessed were solved by analyzing the entire text of the papers and discussing their characteristics. Following assessment of papers that could potentially be included, a total of 8 papers were discarded for the following reasons: three studies were carried out exclusively on people below the age of 65, one because the research was carried out by the same authors on the same population used for another included article and did not add any new results compared to the former, and another four papers were discarded because they did not state albumin values.

33 papers were finally included, with a total population of 91,160 people (82,066 elderly people in the community, 662 in care homes, 8432 in hospital). The mean age of patients in the included papers was between 71.5 and 84.

2.1. Statistical methods

Meta-analysis of the albumin mean value was performed on the studies where it was reported, with both fixed and random effects models, using the inverse variance method and the DerSimonian–Laird estimator for tau^2. Homogeneity among studies was tested by the Q statistic (p-values <0.05 were considered significant) and tau^2, H, I^2 statistics. Statistical analyses were performed with R version 3.0.3 (R Foundation for Statistical Computing, Vienna, Austria) with package meta version 4.0-3 (Guido Schwarzer, meta: Meta-Analysis with R).
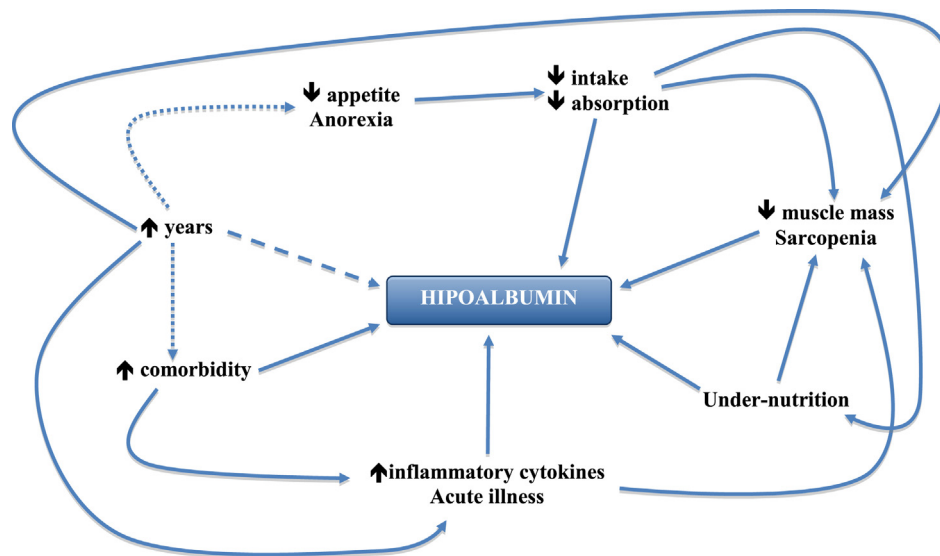

Fig. 1. Graphic representation of physiopathology and mechanisms that determine hypoalbuminemia. The result is accumulative, so the more factors occur in the same person the greater the impact is on the risk of developing hypoalbuminemia. The dashed line represents factors whose importance in determining hypoalbuminemia depends on the presence of other cofactors. The dotted line represents factors that increase the prevalence of other associated factors.