ORIGINAL ARTICLE

Mini nutritional assessment is a good predictor of functional status in institutionalised elderly at risk of malnutrition☆

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Summary
Background & aims: To possibly validate the use of Mini Nutritional Assessment (MNA) with respect to functional status in institutionalised elderly.
Methods: One hundred twenty-three long-term care resident elderly (85.3 ± 8.4 years) were recruited. Nutritional and functional states were assessed by MNA and Barthel Index (BI), respectively. Main inclusion criterion was a $MNA < 23.5$. Anthropometric, biochemical data and oral intake (percentage of food consumed to that delivered) were evaluated.
Results: MNA significantly correlated with BI ($r = 0.55$; $p < 0.0001$). Malnutrition ($MNA < 17$) was characterized by lower BMI, muscle mass, poor nutritional habits and higher weight loss and disability. Similarly, poorer functional status was associated with low BMI, sarcopenia and reduced oral intake. The interrelationship between MNA and BI were investigated by multiple regression models with progressive inclusion of variables (one/analysis). The initial association between MNA and BI ($p < 0.0001$) was masked by weight loss ($p < 0.02$), muscle mass ($p < 0.03$) and oral intake ($p < 0.05$). However, when BI was included as dependent variable the association with MNA depended on sarcopenia ($p < 0.05$) and reduced food consumption ($p < 0.001$).

Conclusions: MNA reliably identifies at-risk institutionalised elderly needing higher standards of care, particularly related to eating. Routine documentation of oral intakes and feeding assistance might be useful to prevent weight loss, sarcopenia and functional status deterioration.

Introduction

Disability is reported very closely linked with malnutrition.[1–4] Both these conditions are very common in nursing home resident elderly[2–4] and different studies underscored their relationship with outcome.[5–8] Unfortunately, up to now no clear explanation of this association has been provided.

In order to prevent nutrition-related complications, early detecting of at-risk patients is considered a key task because it allows to guide optimal and early nutritional support.[9] In this regard, different tools were proposed[10] but, as pointed out many years ago, their efficacy should be tested in different settings.[11] Using the Mini Nutritional Assessment (MNA) is currently recommended for identifying those at-risk and who might benefit more from early nutritional intervention.[10,12] Moreover, its inter- and intra-observer reliability was demonstrated, particularly in institutionalized elderly.[13] It was reported that MNA score also reflects the degree of autonomy, but previous evidence have usually addressed to various settings,[12] while experience in long-term cares is still limited.[1,14] Along with this, the role of functional status was frequently investigated through the use of various indexes and instruments, thus making evidences not uniformly interpretable. Accordingly, the association between MNA and disability in institutionalised elderly persons deserves, in our opinion, to be deepened. This is the main purpose of the present study. Particularly, in order to improve the understanding of this relationship we sought to investigate the underlying links by including only subjects at risk of malnutrition.

Materials and methods

The study was performed in adherence to the principles established with the Declaration of Helsinki. Written informed consent obtained for every subject included. Institutionalized elderly living in two different long-term care structures of the provinces of Milano and Trento were considered. Main exclusion criterion was a MNA score ≥ 24. Subjects with terminal illness were also excluded. The choice of excluding well-nourished patients was made on the basis of two major reasons: (1) in order to avoid the forcing effect of this subsample of patients on the analyses; (2) because this population should be not theoretically candidate to any intervention. Indeed, it is reasonable to argue that patients not at risk of malnutrition are more self-sufficient. Moreover, one of the key to prevention is to possibly identify trigger conditions for clinical management in those who have not yet developed complications but that are more prone to.

Fasting venous blood samples were assessed for full blood count, albumin, prealbumin and transferrin. Collected anthropometric data were: weight, standing height or knee-height (for stature prediction in those bedridden), mid-upper arm and calf circumferences, triceps skinfold. The mean of three different measurements was taken into account. Mid-arm muscle area (AMA) and body mass index were calculated and weight loss was retrospectively obtained from the three-month-previous weight recorded on the clinical register of every patient. The relative percentage (WL%) was considered in the analyses. Nutritional intake was assessed as the percentage of food consumed. The amounts of food delivered to and left by the patients at the end of three main meals (breakfast, lunch, dinner) were weighted and recorded and the mean of three consecutive days was considered for statistical analyses.

Baseline functional and nutritional status assessment

Functional status and disability were evaluated through the Barthel Index (BI) scoring system, which has been recommended by the Royal College of Physicians for routine assessment of older people.[15] This tool is based on twenty-five point questions, covering all the aspects of self-care independence in daily living activities (transfer, walking, stairs, toilet use, dressing, feeding, bladder, bowel, grooming, bathing). A total score of 100 points indicates complete self-sufficiency, while a subject with zero point is completely dependent.[16]

Nutritional status was graded by MNA score. The full MNA includes 18 questions grouped in four rubrics: anthropometry (body mass index, weight loss, mid-upper arm and calf circumference), general state (medications, mobility, presence of pressure ulcers, lifestyle, presence of psychological stress or neuropsychological problems), dietary assessment (loss of appetite, autonomy of feeding, quality and number of meals, fluid intake) and self-perception about health and nutrition. A score ≥ 24 stands for normal nutritional status. However, malnutrition at-risk and protein–calorie malnutrition are defined by MNA = 17–23.5 and MNA < 17, respectively.[12] In the present study, patients with normal nutritional status (MNA ≥ 24) were excluded from the analyses.

Statistics

All statistical analyses were performed by STATISTIX 7.0 (Analytical Software, Tallahassee, FL, USA). Level of significance was established in a p-value < 0.05. The correlation between variables, MNA and BI was evaluated by Pearson's model. Patients were divided in groups according to MNA cut-offs (17–23.5 and <17) and on the basis of the median of BI score (<50 and ≥50). Comparisons between