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Original article

Malnutrition and frailty in community dwelling older adults living in a rural setting

Christa Boulos [a, *], Pascale Salameh [b], Pascale Barberger-Gateau [c, d]

[a] Department of Nutrition, Faculty of Pharmacy, Saint Joseph University, Beirut, Lebanon
[b] Faculty of Pharmacy, Lebanese University, Beirut, Lebanon
[c] Univ. Bordeaux, ISPED, Centre INSERM U897-Epidemiologie-Biostatistique, F-33000 Bordeaux, France
[d] INSERM, ISPED, Centre INSERM U897-Epidemiologie-Biostatistique, F-33000 Bordeaux, France

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SUMMARY

Background & aims: Malnutrition and frailty are frequent and serious conditions within the geriatric population. Both are of multifactorial origin and linked to adverse outcomes. The purpose of this study was to analyze the relationships between these two concepts in a representative sample of rural elderly Lebanese with a high prevalence of malnutrition.

Methods: A cross-sectional study including a representative sample of 1200 elderly Lebanese aged 65 and over living in the community. The following measurements were recorded: information on socio-demographic status, comorbidities, Activities of Daily Living (ADL), screening for depression (5 item Geriatric Depression Scale [GDS]) and cognitive status (Mini-Mental-State [MMS]). Frailty was assessed through the Study of Osteoporotic Fractures (SOF) index whereas nutritional status was measured through the Mini Nutritional Assessment (MNA). Stepwise backwards multinomial logistic regression was used to analyze the association between nutritional status and frailty, independent of these covariates.

Results: Frailty or prefrailty were present in respectively 36.4% and 30.4% of the participants. The proportion of individuals suffering from poor nutritional status increased with growing level of frailty ($p < 0.001$). Fourteen out of the 18 MNA items were associated with frailty in age-adjusted analyses. In the final multinominal logistic regression, both malnutrition and risk of malnutrition were related to a significantly increased risk of frailty, respectively (OR: 3.72, 95% IC: 1.40–9.94/OR: 3.66, 95% IC: 2.32–5.76), whereas the relation between poor nutritional status and prefrailty was not significant, independently of reporting less than three comorbidities, being ADL independent, depressive symptoms, illiteracy, and low cognitive status.

Conclusion: Frailty and malnutrition are two closely related but distinct concepts that share common determinants in this elderly population.

1. Introduction

Malnutrition is a frequent condition in elderly individuals. Its adverse outcomes are extensively documented [1]. The MNA (Mini Nutritional Assessment) is a widely recognized assessment tool for the screening of malnutrition, validated in several studies [2].

Frailty is a common geriatric syndrome which gained growing interest in geriatric research. Frailty is characterized by increased vulnerability to serious health outcomes and functional decline [3,4]. As for malnutrition, frailty is the result of age-related, physical, psychological and social factors and events in the life course of elderly people [3,5].

Recently, the close relationship between malnutrition assessed by the MNA and frailty has gained growing attention [6,7]. Some authors have suggested that the MNA could be a useful tool to identify frail elderly people [7]. This may be explained by the overlap of several MNA items and frailty criteria, especially those related to physical weakness and weight loss [7]. In a convenience

* Corresponding author. Saint Joseph University, Damascus Street, Beirut, Lebanon. Tel.: +961 3449532.
E-mail addresses: christa.boulos@gmail.com (C. Boulos), pascalesalameh1@hotmail.com (P. Salameh), Pascale.Barberger-gateau@isped.u-bordeaux2.fr (P. Barberger-Gateau).

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sample of 100 older patients admitted to a geriatric unit, Dent et al. [8] found that the MNA Short Form was able to predict both malnutrition and frailty. Furthermore, Bollwein et al. [9] reported a significant association of most MNA items with the frailty index, according to Fried's criteria, in a convenience sample of 206 German elderly individuals aged ≥75 years. One of the limitations of this study was its small and unrepresentative sample with a low prevalence (15.1%) of risk of malnutrition and no actual malnutrition case. As suggested by the author, it would be of great interest to study the association between the MNA items and other frailty tools, in larger representative samples. Moreover, data are lacking about frailty in less developed countries, which are faced with rapidly growing elderly population and where the prevalence of malnutrition is high [10]. In the AMEL study, based on a representative sample of elderly Lebanese community-dwellers living in rural settings, the prevalence of malnutrition was 8.0% and the risk of malnutrition 29.1%, respectively [11]. In the same study, significant correlates of malnutrition included socio-demographic characteristics, comorbidities, risk for depression and cognitive impairment [12]. These risk factors of malnutrition have also been associated with frailty [13].

Based on the current level of evidence, we may hypothesize that malnutrition and frailty are two closely related concepts sharing common determinants. Furthermore, malnutrition may act on the underlying pathway relating socio-demographic and health related factors with frailty.

In order to better understand the relationships between these two conditions, the purpose of this study was to describe the correlates of frailty and to analyze its association with malnutrition assessed on the MNA and each of its 18 items in a large, representative sample of community dwelling elderly Lebanese living in rural areas.

2. Materials and methods

2.1. Study population

This cross sectional study included 1200 randomly selected community dwelling rural Lebanese elderly aged ≥65 years. The survey was carried out between March 2011 and March 2012. Individuals were questioned during home interview by trained interviewers after verbal informed consent. The participation rate was 95.3%. Details of the sampling procedure and basic characteristics of the study sample have been published in a previous paper [11].

2.2. Measures

2.2.1. Socio-demographic indicators and health related characteristics

Baseline socio-demographic variables included gender, age, marital status, educational level, financial status and living condition (living alone: yes/no).

Health and functional status was reported through the number of chronic diseases, the daily drug intake and the activities of daily living (ADL) dichotomized into “disabled for ≥1 ADL/not disabled”. Cognitive status was assessed by the Mini-Mental-State (MMS) examination [14]. Due to high illiteracy a modified version of the original MMS was created and applied to illiterate people. Screening for depression was based on the 5-item Geriatric Depression Scale (5-item GDS) [15].

2.2.2. Assessment of nutritional status

The Mini Nutritional Assessment (MNA) in its Arabic version was used to assess the nutritional status of the participants. The MNA includes 18 questions regarding anthropometric, general, dietetic, and subjective evaluation [2]. The full MNA was administered to all participants. MNA scores <17 out of 30 were defined as “malnutrition”, scores between 17 and 23.5 as “at risk of malnutrition” and scores >23.5 as “normal”. Poor nutritional status was defined as being either malnourished or at risk of malnutrition.

2.2.3. Assessment of frailty

To investigate frailty we choose the Study of Osteoporotic Fractures (SOF) frailty index, a simple and easy to use tool, which was validated by Ensrud et al. [16,17] in two large cohorts, including respectively 6701 women and 3132 men and showing its ability to predict several adverse outcomes such as falls, fractures, disability and death as well as the more complex frailty index according to Fried [4]. The SOF frailty index includes three components: involuntary weight loss of more than 5 kg during the past year, inability to rise from a chair five times without using arms and reduced energy level for at least 3 days during the past week. According to the author, frailty status was defined as robust (0 component), pre-frail (1 component), or frail (≥2 components) [16].

2.2.4. Statistical analysis

The Statistical Package for Social Sciences (SPSS) version 19.0 was used to enter and analyze data. Categorical variables were presented through percentages while means and standard deviation were applied for continuous variables. We used chi-square tests to study bivariate associations between explanatory variables (socio-demographic indicators, physical and mental health status, nutritional status [MNA categories]) and the three classes of frailty according to the SOF index, considered as dependent variable. One way ANOVA test was applied to compare means across the three frailty groups for continuous variables (age, MMS 1/2).

Bivariate associations between each individual MNA item and frailty groups were first assessed through multinominal logistic regression adjusted for age, as a major potential confounder. Associations were considered as significant for a p-value less than 0.05, after Bonferroni's adjustments.

Finally, stepwise backwards multinominal logistic regression was applied to study the association of malnutrition with frailty, independently of other covariates. Odds-ratios with 95% confidence intervals were calculated. We introduced the main socio-demographic and health related variables that may be associated with frailty together with nutritional status (MNA).

2.2.5. Ethical statement

The study received the approval of the ethics committee of St Josephs University of Beirut.

3. Results

The study sample included 1200 elderly subjects (609 women and 591 men) with a mean age of 75.7 years (SD = 7.1). According to the MNA categories, 8.0% of the participants were malnourished and 29.1% were at risk of malnutrition (results not shown).

Based on SOF criteria, frailty was present in 36.4% of the 1120 respondents, whereas 341 (30.4%) were considered as prefrail and 371 (33.2%) as robust. Frailty or prefrailty were significantly more frequent with increasing age, in females, in widowed elderly, in low educated and in poorer individuals (Table 1). Also, higher comorbidity, polymedication, ADL-disability, depressive symptoms and lower cognitive performances were significantly more prevalent among frail participants (Table 1).

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