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Original

Evaluation of the mini-nutritional assessment short-form (MNA-SF) among institutionalized older patients in Spain

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Abstract

Introduction: **In the present study, we evaluated a short form version of MNA test in a multicenter study and the relationship of different biochemical markers with MNA-SF scores.**

Material and methods: **This was a cross-sectional survey covering a sample of representative of the older institutionalized Spanish population aged above 65 years (n = 873). A Mini nutritional assessment short form test (MNA-SF) was used.**

Results: **The number of patients classified as well nourished (42.1%) was larger in the 65-74(52.6%) range than in the 75–84 (40.2%), 85-94 (43.8%) and > 95 (24%) age ranges. Risk of undernutrition occurred in a total of 506 patients (57.9%), risk of undernutrition was larger in > 95 (76%) range than in 65-74 (47.4%), 75-84 (59.8%) and 85-94 range (56.2%). No differences were detected between males and females at risk of undernutrition (odds ratio: 0.85 CI 95%: 0.64-1.12).**

Conclusion: **In this multicenter study, institutionalized patients have a high prevalence of at risk of malnutrition assessed by MNA-SF test.**

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Key words: *Institutionalized patients. Malnutrition. Nutrition evaluation.*

EVALUACIÓN DEL TEST CORTO DE VALORACIÓN NUTRICIONAL (MNA-SF) EN ANCIANOS INSTITUCIONALIZADOS EN ESPAÑA

Resumen

Introducción: **En el presente estudio, se evaluó una versión corta del test MNA en un estudio multicéntrico y se valoro la relación de los marcadores bioquímicos con el test MNA-SF.**

Material y métodos: **Se realizó un estudio transversal de una muestra representativa de la población anciana institucionalizada española de más de 65 años (n = 873). Se utilizó en todos los pacientes el test de valoración nutricional en su versión corta (MNA-SF).**

Resultados: **El número de pacientes clasificados como bien nutridos (42,1%) fue mayor en los ancianos de 65-74 años (52,6%) que en el rango de edad entre 75 a 84 (40,2%), 85-94 años (43,8%) y > 95 años (24%). La situación de riesgo de desnutrición se produjo en un total de 506 pacientes (57,9%), este riesgo de desnutrición fue mayor en los ancianos mayores de 95 años (76%) que en el rango de edad de 65 a 74 años (47,4%), de 75 a 84 años (59,8%) y de 85-94 años (56,2%). No se detectaron diferencias entre hombres y mujeres en riesgo de desnutrición (OR: 0,85 IC 95% : 0.64-1.12).**

Conclusión: **En este estudio multicéntrico, los pacientes ancianos institucionalizados tienen una alta prevalencia de riesgo de desnutrición evaluada por el test MNA-SF.**

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Palabras clave: *Paciente institucionalizado. Malnutrición. Evaluación nutricional.*

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Introduction

Malnutrition is a prevalent problem in hospitalized and institutionalized patients.[1-2] Data produced from studies involving different Hospitals designed to study malnutrition in terms of patient outcome, hospital stance or costs confirm the high prevalence of malnutrition.[3] The Council of Europe has published the resolution "Food and nutritional care in hospitals: How to prevent under nutrition. Report and recommendations".[4] This is an important position document in this matter.

Malnutrition is often unrecognised and subsequently goes untreated. Anthropometry measurements are generally considered as the single most easily obtainable and non-invasive method by which to assess nutritional state. Biochemical measurements such as serum albumin and lymphocyte count are also well known as markers for the malnutrition and are the most commonly used laboratory tests.[5] The evaluation of nutritional conditions in the elderly population demands the utilization of easy, precise and fast methods. The Mini-Nutritional Assessment (MNA) test, that attributes scores based on dietetic, anthropometric, subjective and global assessments,[6] congregates those advantages and has been evaluated in geriatric patients.[7-8] However, its length impedes its use as a brief screening tool. Several questions require special training (e.g., anthropometrics) or subjective judgements. The MNA takes approximately 10 to 15 minutes to administer. This is a reasonable length for a diagnostic test but is perhaps too long for a screener in a primary care setting. A short form of MNA (MNA-SF) could be a good tool to screen malnutrition in these patients.[9]

In this study, we evaluated a short form version of MNA test in a multicenter study to assess malnutrition in an institutionalized elderly population.

Material and methods

Subjects

This was a cross-sectional survey covering a sample of representative of the institutionalized Spanish population aged above 65 years. The study was approved by the Clinical Research Ethics Committee of the Medicine School (University of Valladolid). Forty-five centers were selected by means of probabilistic sampling, followed by selections of 20 individuals of each center.

Information was gathered over the course of 2007 through personal interviews. This was followed by a physical examination to measure blood pressure, and anthropometric variables. Interviewers underwent standardized training to administer the questionnaire and anthropometric measurements. The final sample study consisted of 873 patients, 561 females and 312 males.

Assays

Blood samples were taken after 12 hour overnight fast. Plasma glucose levels were determined by using an automated glucose oxidase method (Glucose analyser 2, Beckman Instruments, Fullerton, California). Serum total cholesterol and triglyceride concentrations were determined by enzymatic colorimetric assay (Technicon Instruments, Ltd., New York, N.Y., USA). Albumin (3,5-4,5 g/dl) and transferrin (200-400 mg/dl) were measured with an auto analyser (Hitachi, ATM, Mannheim, Ger). Iron (30-300 ng/ml) were analysed with an analyser (Beckman Coulter, Inc, LA, CA).

Anthropometric measurements

Body weight was measured to an accuracy of 0.1 kg and height was measured in centimetres using a stadiometer. Body mass index computed as body weight in kilograms/(height in meters^2).

Mini-nutritional assessment short-form test

The standard MNA test is composed of simple measurements and questions that can be completed in about fifteen minutes. The MNA-SF test is composed of 6 questions: anthropometric measurement (body mass index and weight loss), global assessment (motility), dietary question (food intake) and health assessment (acute diseases and neurological problems). The sum of MNA-SF score distinguishes between two groups of patients: a) 12 points or greater (normal, no need for further assessment) and b) 11 points or below (possible malnutrition, continue assessment).[10]

Statistical analysis

The results were expressed as mean standard deviation. The distribution of variables was analysed with Kolmogorov-Smirnov test. Quantitative variables with normal distribution were analysed with student t-test. Non-parametric variables were analysed using the Mann-Whitney U test. Discrete variables were analysed with the chi-square test, with Yates correction as necessary, and Fisher's test. Correlation analysis was realized with Pearson test. Odds ratios were calculated to compare males and females. A p-value under 0.05 was considered statistically significant.

Results

A total of 873 patients were enrolled, mean age was 82.6 ± 8.3 years, weight 66.1 ± 14.7 kg and BMI 27.2 ± 5.6. The sex distribution of patients was 312 (35.7%)

Table I
Distribution of patients according to gender, age range and nutritional status

Age range	Well nourished			At risk of undernutrition			Total		
	F	M	T	F	M	T	F	M	T
65-74 years	32 (49.9)	40 (55.5)	72 (52.6)	33 (50.1)	32 (44.6)	65 (47.4)	65 (47.4)	72 (52.6)	137 (100)
75-84 years	79 (48)	63 (43.4)	142 (40.2)	129 (62)	82 (55.6)	211 (59.8)	208 (58.9)	145 (41.1)	353 (100)
85-94 years	102 (43.2)	33 (45.8)	135 (43.8)	134 (56.8)	39 (54.2)	173 (56.2)	236 (76.6)	72 (23.4)	308 (100)
> 95 years	15 (29.8)	3 (13.1)	18 (24)	37 (71.2)	20 (86.9)	57 (76)	52 (69.3)	23 (30.7)	75 (100)
Total:	228 (40.6)	139 (44.6)	367 (42.1)	333 (59.4)	173 (55.4)	506 (57.9)	561 (64.3)	312 (35.7)	873 (100)

MNA-SF is used for classification of patients who are well nourished and at risk for undernutrition. F: females; M: males; T: total. Number in parentheses represents the percentage value.

males and 561 (64.3%) females. In males, mean age was 80.1 ± 8.1 years, weight 71.8 ± 14.1 kg and BMI 27.2 ± 4.9. In females, mean age was 84.1 ± 7.9 years, weight 62.8 ± 14.1 kg and BMI 27.1 ± 5.8.

Table I shows the distribution of patients according their gender, age range and nutritional state. The number of patients classified as well nourished (42.1%) was larger in the 65-74 (52.6%) range (n = 72) than in the 75-84 (40.2%) (n = 142) ($p < 0,02$), 85-94 (43.8%) (n = 135) ($p < 0,01$) and > 95 (24%) (n = 18) ($p < 0,001$) age ranges (see table I). Risk of undernutrition occurred in a total of 506 patients (57.9%), risk of under nutrition was larger in > 95 (76%) range than in 65-74 (47.4%) ($p < 0,005$), 75-84 (59.8%) ($p < 0,02$) and 85-94 range (56.2%) ($p < 0,01$), assessed by chi square proportion test. No differences were detected between males and females at risk of undernutrition (odds ratio: 0.85 CI95%:0.64-1.12).

Table II
Mean values for the two categories of nutritional state according the MNA-SF classification (screening results)

Parameters	Gender	At risk	Well nourished	Total
Age (years)	Total	83.3 ± 8.4	81.7 ± 7.9*	82.6 ± 8.2
	Female	84.5 ± 8.1+	83.5 ± 7.7+,*	84.1 ± 7.9+
	Male	80.2 ± 8.6	79.1 ± 7.3*	80.1 ± 8.1
Glucose (mg/dl)	Total	96.1 ± 32.8	107.7 ± 37*	100.9 ± 39.5
	Female	96.3 ± 34.1	105.3 ± 34.8*	99.8 ± 34.6
	Male	95.7 ± 30.1	111.7 ± 42.2*	102.9 ± 36.9
Total cholesterol (mg/dl)	Total	180.5 ± 40.4	185.4 ± 42.1	182.6 ± 41.2
	Female	184.6 ± 38.3+	189.8 ± 41.8+	186.4 ± 39.8+
	Male	172.6 ± 43.1	178.5 ± 41.6	175.3 ± 42.4
Triglycerides (mg/dl)	Total	113.3 ± 51.4	115.9 ± 54.7	114.4 ± 36.3
	Female	113.1 ± 50.8	117.3 ± 50.8	114.8 ± 50.8
	Male	113.8 ± 52.6	113.6 ± 60.2	113.6 ± 56.1
Hemoglobin (g/dl)	Total	12.7 ± 1.8	12.9 ± 1.6	12.8 ± 1.7+,+
	Female	12.5 ± 1.5+	12.6 ± 1.5+	12.5 ± 1.5
	Male	13.3 ± 2.1	13.5 ± 1.7	13.4 ± 1.9
Albumin (g/dl)	Total	3.7 ± 0.6	3.9 ± 0.8*	3.8 ± 0.8
	Female	3.6 ± 0.6	3.8 ± 0.8*	3.8 ± 0.7
	Male	4.0 ± 0.8	4.1 ± 0.9	4.1 ± 0.8
Transferrin (mg/dl)	Total	220.7 ± 49.9	225.6 ± 49.2	222.8 ± 49.6
	Female	224.3 ± 49.1+	227.9 ± 46.1+	225.8 ± 47.9+
	Male	212.9 ± 51.1	221.8 ± 54	216.6 ± 52.4
Iron (μg/dl)	Total	68.7 ± 30.3	75.5 ± 51.5*	71.4 ± 40.1
	Female	64.6 ± 25.8+	69.3 ± 32.1+,+	66.5 ± 28.5+
	Male	76.3 ± 3.1	86.6 ± 7.6*	80.4 ± 54.3

*Statistical differences between well nourished and at risk.
+Statistical differences in 2 categories of MNASF between male and female in age, cholesterol, haemoglobin, iron and transferrin levels.

Table III
Correlation analysis performed between MNA-SF scores and some parameters

Dependent variable	*Independent variable*	*Gender*	*r Pearson*	*p*
MNA	Age	Total	-0.04	0.307
		Female	0.09	0.886
		Male	-0.05	0.370
MNA	Hemoglobin	Total	0.17	0.001
		Female	0.11	0.048
		Male	0.20	0.008
MNA	Transferrin	Total	0.24	0.024
		Female	0.17	0.017
		Male	0.24	0.022
MNA	Iron	Total	0.22	0.001
		Female	0.15	0.015
		Male	0.28	0.001
MNA	Albumin	Total	0.11	0.032
		Female	0.08	0.149
		Male	0.05	0.515

Table II shows the means of the variables in each MNA-SF classification for each gender and for the total group. Statistical differences among MNA-SF classification was detected in age, glucose, albumin and iron. Age was higher in at risk group than well nourished group. Albumin, iron, glucose levels were higher in well nourished group than at risk group. In females were higher age, total cholesterol, and transferrin levels than males. In males were higher iron levels than females.

Table III shows the correlation analysis performed between MNA-SF scores and some parameters. MNA-SF scores were correlated with haemoglobin, transferrin, iron in total group, males and females. Albumin correlates with MNA-SF score only in total group.

Discussion

The frequencies of at risk of undernutrition (57.9%) and well nourished (42.1%) in our population were within the range presented in the literature. MNA-SF is associated with biochemical indicators of nutritional status, is an easy-to-use and inexpensive tool in clinical practice, which reinforces its importance in the clinical assessment of institutionalized patients.[9,11]

Under nutrition is common in this population, can develop or worsen in institutions, and is associated with poor outcomes. Different studies show the scares attention granted to the nutritional state in clinical practice in our area, using parameters as weight, BMI, skinfolds, corporal circumferences, albumin and prealbumin.[12] In clinical practice we have a lot of nutritional assessment variables and these variables vary in their ability to discriminate malnutrition.

Mininutritional Assessment Test (MNA) is a simple screening test for patients. Validation studies have shown that the assessment score is correlated with clinical, anthropometric a biological variables.[13] In 32 studies of institutionalized elderly subjects (n = 6,821 elderly) using the MNA, the prevalence of malnutrition was 21% (range 5-71%) and risk for malnutrition was 51% (range 27-70%). The prevalence of well-nourished subjects was 29% (range 4-61%).[14] These previous work shows that MNA is an accurate assessment tool for nutritional problems, and is highly correlated with both clinical assessment of nutritional status and objective indicators such as serum albumin and adverse clinical events.[15-17]

In our study, the MNA-SF has 6 questions instead of 18, eliminates time-consuming and subjective items, and can be administered in approximately 3 minutes. These measures are relatively easy to obtain and are often available in patient records. However, it also has limitations due to this partial approximation to the nutritional assessment. As our data shows, the high rates of at risk of undernutrition was observed in the age > 95. The effect of age is not always observed in malnourished subjects and those at risk of malnutrition,[18,19] but it is expected that older people has more nutritional problems than younger one.

The two MNA-SF categories showed statistically differences among age, glucose, albumin and iron levels. Patients at risk of malnutrition had high age than well-nourished and less iron, glucose and albumin levels well-nourished. The comparison by gender showed statistical significance among age, haemoglobin, transferrin and iron levels. A positive correlation of haemoglobin, transferrin, iron and albumin were verifies with MNA-SF values. Undernutrition starts with an improper intake of nutrients and progresses through a series of functional and biochemical changes such as haemoglobin, transferrin, iron and albumin. In a previous study MNA-SF values had high correlation with albumin levels.[9] Other authors[11] have demonstrated that

MNA-SF is a useful screening tool for hospitalized elders at risk of malnutrition. It is associated with clinical outcomes and is able to predict functional decline. In elderly acute medical patients in general wards, the MNA-SF have a high sensitivity,[19] too. This short form test has been proposed to be used as the first step of an efficient preoperative nutritional evaluation of ambulatory elderly patients.[10]

Taking into account the high prevalence of patients at risk of malnutrition, a rational strategy for nutritional screening in the elderly population is needed. Data presented here suggest that nutritional screening can be performed efficiently using the MNA-SF.

In this multicenter study, institutionalized patients have a high prevalence of at risk of malnutrition assessed by MNA-SF test. MNA-SF presented weak correlation with biochemical marker, we conclude that MNA-SF test must be an important device in the clinical evaluation of institutionalized patients. A major assumption underlying a nutritional screening strategy is that patients discovered to be malnourished or at risk will benefit from being detected, in a high risk population of elderly patients with a lot of co morbidities.

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References

1. Pablo MA, Tzaga MA, Alday LA. Assessment of nutritional status on hospital admissions, nutritional scores. *Eur J Clin Nutr* 2003; 57: 824-831.
2. Alves de Rezende CH, Marquez Cuhna T, Alvarena Junior V, Pehna-Silva N. Dependence of Mini-Nutritional Assessment scores with age and some hematological variables in elderly institutionalized patients. *Gerontology* 2005; 51: 316-321.
3. De Luis DA, López Guzmán A. Nutritonal status of adult patients admitted to internal medicine departments in public hospitals in Castilla y Leon, Spain- A multicenter study. *Eur J of Internal Medicine* 2006; 17: 556-560.
4. Council of Europe. Food and nutritional care in hospitals: How to prevent undernutrition. Report and recommendations. Public Health committee of experts on nutrition, food safety and consumer health. Paris, 2002.
5. Seiler WO. Clinical pictures of malnutrition in ill elderly subjects. *Nutrition* 2001; 17: 496-498.
6. Guigoz Y, Vellas B, Garry PJ. Assessing the nutritional status of the elderly: The Mini Nutritional Assessment as part of the geriatric evolution. *Nutr Rev* 1996; 54: 559-565.
7. Persson MD, Brismar KE, Katzarski KS, Nordenstrom J, Cederholm TE. Nutritional status using Mini Nutritional Assessment and subjective global assessment predict mortality in geriatric patients. *J Am Geriatr Soc* 2002; 50: 1996-2002.
8. Arellano M, GarcÍa Caselles MP, Pi-Figueras M, Miralles R, Torres RM, Aguilera A, Cervera AM. Clinical impact of different scores of the Mini Nutritional Assessment in the diagnosis of malnutrition in patients with cognitive impairment. *Arch Gerontol Geriatr* 2004; 38: 27-31.
9. Rubenstein LZ, Harker J, Salva A, Guigoz Y, Vellas B. Screening for undernutrition in geriatric practice: developing the short form mini-nutritional assessment (MNA-SF). *J of Gerontology* 2001; 56: 366-372.
10. Cohendy R, Rubenstein LZ, Eledjam JJ. The mini nutritional assessment short form for preoperative nutritional evaluation of elderly patients. *Aging* 2001: 13: 293-297.
11. Salvi F, Giorgi R, Grilli A, Morchi V, Espinosa E, Spazzafumo L. MiniNutritional assesment (short form) and functional decline in older patients admitted toa n acute medical ward. *Agng Clin Exp Res* 2008; 20: 322-328.
12. Sánchez López AM, Moreno ores R, Pérez de la Cruz A, Orduna Espinosa R. Malnutrition prevalence in patients admitted to a rehabilitation and orthopaedic surgery hospital. *Nutr Hosp* 2005; 20: 121-130.
13. Kuzuya M, Kanda S, Koike T, Suzuki Y, Iguchi A. Lack of correlation between total lymphocyte count and nutritional status in the elderly. *Clinical Nutrition* 2005; 24: 427-432.
14. Guigoz Y. The Mini nutritional assessment. Review of the literature-what does it tell us? *The Journal of Nutrition, Health Aging* 2006; 10: 466-487.
15. Quadri P, Fragiocomo C, Perotoldi W, Gugoz Y. MNA and cost care. *Nestle Nutr Workshop Ser Clin Perform Programme* 1999; 1: 141-147.
16. Thomas DR, Zdrowski CD, Wilson MM, Conright KC. Malnutrition in subacute care. *Am J Clin Nutr* 2002; 75: 308-313.
17. Donini LM, Savina C, Rosano A, de Felice MR, Tassi L. MNA predictive value in the follow-up of geriatric patients. *Nutr Health Aging* 2003; 18: 282-293.
18. Ranhoff AH, Gjoen AU. Mowe M. Screening for malnutrition in elderly acute medical patients: the usefulness of MNA-SF. *J Nutr Health Aging* 2005; 9: 221-225.
19. Izaola O, de Luis DA, Cabezas G. MNA como método de evaluación nutricional en pacientes hospitalizados. *An Med Interna* 2005; 22: 313-316.
19. Ramón JM, Subira C. Prevalencia de malnutrición en la población española anciana. *Med Clin (Barc)* 2001; 117: 766-770.