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Research brief

Assessing elderly at risk of malnutrition: The new Geriatric Nutritional Risk Index versus Nutritional Risk Index

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The present research letter aims to compare a recently validated index of nutritional risk, the Geriatric Nutritional Risk Index (GNRI), with the Nutritional Risk Index (NRI) as they relate to biochemical and anthropometric variables usually investigated during the assessment of nutritional status. Moreover, we will suggest a possible use of the GNRI in screening and grading nutritional status.

The wide spectrum of tools available for nutritional assessment is growing larger. The GNRI, a new index for evaluating at-risk elderly medical patients, was recently presented by Bouillanne et al. [1]. The GNRI is an adaptation of the NRI, which was first described by Buzby et al. [2] to score nutritional risk in surgical patients, and is a simple and accurate, validated tool for predicting elderly patients at risk of morbidity and mortality. Because of the frequent difficulty of obtaining usual body weight in elderly patients, Bouillanne et al. [1] hypothesized that this value in the NRI formula could be replaced by ideal body weight calculated according to the Lorentz formula, which in turn overcomes the unavailability of real height by using knee height ($NRI = [1.519 \times albumin, g/L] + [41.7 \times present/usual\ body\ weight]$; $GNRI = [1.489 \times albumin, g/L] + [41.7 \times present/ideal\ body\ weight]$). Both the GNRI and the NRI formulas are structured to provide greater weight to albumin, which is a stronger predictor of mortality in the general population [3] than is body weight. However, the NRI, which takes into account usual body weight, seems to be related more to a history of recent weight loss, an indicator that also has been associated with increased mortality [4]. In an extension of this observation, we present information about the relations between these two indexes of nutritional risk and other biochemical and anthropometric variables that are usually investigated in nutritional status assessment.

In our analysis of 177 elderly subjects consecutively admitted to the same long-term care unit (68 men and 109 women; mean age ± SD, 80.0 ± 8.6 years; Range, 65–98 years; mean body mass index ± SD, 25.2 ± 4.9 kg/m^2; range, 15.4–38.9 kg/m^2), the availability of data on usual body weight led us to make a comparative analysis of the GNRI and the NRI. Anthropometric measurements (weight, height, knee height, arm circumference, and triceps skinfold thickness) and fasting blood sample assessments (serum albumin, prealbumin, and total lymphocyte count) were performed within 48 h. Subjects with hepatic, renal, and neoplastic diseases were excluded. According to GNRI and NRI cutoffs (severe risk: GNRI <82, NRI <83.5; moderate risk: GNRI 82–92, NRI 83.5–97.5; low risk: GNRI 92–98, NRI 97.5–100; no risk: GNRI >98, NRI >100), patients were classified as follows: 3.5%, 14.2%, 33.8%, and 48.5% at severe risk, moderate risk, low risk, and no risk according to the GNRI and 3.9%, 33.8%, 18.1%, and 44.2% at severe risk, moderate risk, low risk, and no risk according to the NRI, respectively. An accordance of 62.1% (Cohen κ test; SAS 8.2, SAS Institute, Cary, NC, USA) in grading nutritional risk was found between the two indexes, above all for the no-risk category ($n = 70$). Results of a one-way analysis of variance that was conducted to examine correlations between anthropometric and biochemical variables and the GNRI and the NRI (linear regression model; GraphPad 3.0, GraphPad Software, Inc., San Diego, CA, USA) are presented in Table 1. In contrast with the NRI, the GNRI showed a significant correlation with most anthropometric variables, except arm muscle area. For both indexes, a significant correlation was detected for biochemical variables such as albumin, prealbumin, and, interestingly, total lymphocyte count, which is commonly considered to be a negative prognostic factor for mortality in older persons

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Table 1
Comparisons of GNRI and NRI groups and their correlations with nutritional variables*

	Subjects (*n*)	Analyses	Weight (kg)	BMI (kg/m^2)	WL (%)	AC (cm)	TSF (mm)	AMA (cm^2)	Albumin (g/L)	Prealbumin (g/L)	TLC (/mm^3)
GNRI											
		$P^{\dagger}$	<0.0005	<0.0001	<0.0001	<0.005	<0.005	>0.05	<0.0001	<0.0001	<0.005
		$r^{\ddagger}$	0.2646	0.2852	0.3240	0.2406	0.2127	0.1347	0.9473	0.5246	0.2179
<82	6		51.2 ± 9.4	20.6 ± 4.1	−7.3 ± 4.6	22.5 ± 2.9	10.2 ± 3.1	37.0 ± 14.1	25.1 ± 7.1	8.5 ± 8.3	1078 ± 547
82–92	25		58.5 ± 13.0	22.9 ± 4.5	−3.6 ± 5.5	25.1 ± 4.6	11.6 ± 6.0	45.3 ± 21.1	32.7 ± 2.4	14.8 ± 6.2	1347 ± 670
92–98	60		64.1 ± 15.2	25.6 ± 5.1	−0.9 ± 3.7	27.9 ± 4.6	15.5 ± 6.6	54.8 ± 23.8	36.7 ± 2.0	21.3 ± 5.7	1789 ± 835
>98	86		66.2 ± 12.1	25.9 ± 4.1	−1.0 ± 2.7	27.9 ± 4.3	15.8 ± 5.6	52.9 ± 22.1	41.0 ± 2.3	22.8 ± 5.9	1874 ± 688
		$P^{\S}$	<0.01	<0.005	<0.0001	<0.005	<0.01	>0.05	<0.0001	<0.0001	<0.05
NRI											
		$P^{\dagger}$	>0.05	>0.05	>0.05	<0.0001	>0.05	>0.05	<0.0001	<0.0001	<0.001
		$r^{\ddagger}$	0.1375	0.1465	0.4336	0.1012	0.1281	0.0123	0.9823	0.5241	0.2592
<83.5	7		53.6 ± 9.9	22.1 ± 2.6	−10.5 ± 5.7	24.5 ± 3.4	11.9 ± 3.6	46.2 ± 14.4	25.7 ± 6.5	10.2 ± 7.5	844 ± 501
83.5–<97.5	60		64.6 ± 12.4	25.2 ± 4.7	−2.3 ± 4.0	27.7 ± 4.5	15.2 ± 7.0	55.3 ± 23.6	34.5 ± 2.2	18.6 ± 6.9	1592 ± 734
97.5–100	32		62.3 ± 15.6	25.5 ± 4.8	−0.5 ± 3.6	27.3 ± 4.8	14.9 ± 6.1	50.8 ± 21.9	37.9 ± 0.8	19.8 ± 6.6	1957 ± 775
>100	68		64.9 ± 13.8	25.4 ± 4.7	−0.6 ± 2.1	27.3 ± 4.6	15.0 ± 6.6	50.3 ± 22.6	41.5 ± 2.1	23.5 ± 5.3	1862 ± 723
		$P^{\S}$	>0.05	>0.05	<0.0001	>0.05	>0.05	>0.05	<0.0001	<0.0001	<0.001

AC, arm circumference; AMA, arm muscle area; BMI, body mass index; GNRI, Geriatric Nutritional Risk Index; NRI, Nutritional Risk Index; TLC, total lymphocyte count; TSF, triceps skinfold; WL, weight loss

* Data are presented as mean ± SD.

† Linear regression model.

‡ Pearson's linear correlation coefficient.

§ One-way analysis of variance.

[3,5]. In addition, comparative analyses of nutritional classes (analysis of variance) seemed to reinforce these results.

Bouillanne et al. [1] correctly emphasized that the GNRI should be considered a "nutrition-related" risk index and not an index of malnutrition. This distinguishes the GNRI from the NRI, which by extension has been used as an index of malnutrition. The NRI combines albumin with a second nutritional indicator such as recent weight loss, which is frequently used in defining and grading malnutrition [6–8]. It is noteworthy that the GNRI ranges are also based on an evaluation of weight loss [1], and the present correlation with percentage of weight loss might be explained accordingly. Moreover, the GNRI showed significant correlations with all other biochemical markers of nutritional status, which suggests a possible use of this new nutritional indicator in grading malnutrition, as was the case for the NRI. The GNRI, which requires only routine measurement (albumin, weight, and knee height), is a simple and appropriate tool for clinical use. It has been validated to better fit an older population that is usually at higher risk of health complications. In the math of nutrition, finding a tool that is useful for describing nutritional status and risk of complications (prognosis) should be the primary goal. Thus, future studies might be designed to investigate the screening and grading power of the GNRI by comparing it with other validated screening tools for elderly patients, such as the Mini Nutritional Assessment (a tool recommended by European Society of Parenteral and Enteral Nutrition guidelines for screening and grading malnutrition) [9,10].

We recognize that most patients are classified as being at "no risk" and that only a few belong to the "severe risk" class. This may be related to the setting from which the subjects are recruited. Patients who are admitted to a tertiary care institution usually have fewer complications due to acute illnesses, a factor frequently related to albuminemia [3]. Patients with an acute illness who are admitted to the hospital should also be evaluated. Moreover, particularly in light of the low degree of accordance between these two indexes, a prospective analysis comparing the prognostic value of the two indexes would be of interest.

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