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Letter to the editor

Malnutrition in older patients with cancer: Appraisal of the Mini Nutritional Assessment, weight loss, and body mass index^{☆,☆☆}

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1. Introduction

Malnutrition is common in older patients with cancer (age over 65 years old), with a prevalence ranging from 30% to 85% [1] and it is a big public health issue in the United States. However, older patients with cancer are one of the most underdiagnosed patient groups [2]. Cancer-associated malnutrition is multifactorial including local tumor effects, the host response to the tumor, and the effects of anticancer therapies [3]. Nutritional assessment and screening tools can be useful for identifying malnutrition status among older patients with cancer. However, there are currently no ideal methods for screening and diagnosing older patients with cancer with malnutrition.

Several screening tools have been designed and are available for older patients with cancer, including Body Mass Index (BMI), Weight loss and Mini Nutritional Assessment (MNA). A BMI below 20 kg/m² has been found to have high sensitivity in the diagnosis of severe malnutrition in the older patients with cancer [4]. Weight loss, an indicator of malnutrition, is strongly associated with poor outcomes, including increased mortality, across all stages and types of cancer [5]. MNA is a quick, non-invasive, inexpensive, and well validated scale, and it takes about 5 min to complete [6]. It is a seven-item tool, that can easily be performed by health professionals in hospitals and nursing homes or by general physicians for the early detection of malnutrition risk [6]. In hospital settings, a low MNA (0–7) score has been associated with an increase in mortality, prolonged length of stay, and greater likelihood of discharge to a nursing home. The MNA can detect a risk of malnutrition before a severe change in weight or serum proteins occurred [7]. Studies have demonstrated that it is internally consistent and has an inter-observer reliability of 0.51 to 0.89, sensitivity of 89%, specificity

of 82%, and strong positive predictive value (Youden Index = 0.70) [8]. However, its validity has not been extensively evaluated among older patients with cancer.

We sought to assess malnutrition in older patients with cancer using the MNA, weight loss, and BMI and compare their agreement.

2. Subjects and Methods

This was a retrospective cohort study conducted at The University of Texas MD Anderson Cancer Center and approved by the IRB board. Participants included in this study had been referred for comprehensive geriatric assessment at the Program for Healthy Aging from January 1, 2013, through December 31, 2015. Patients were older adults undergoing cancer care, who lived in the community and were ambulatory. They were eligible for our study if they were 65 years of age or older; had undergone a comprehensive geriatric assessment; and were scheduled for breast gastroenterological, urologic surgery or allogeneic stem cell transplantation.

2.1. Malnutrition Assessment

The MNA includes questions regarding changes in food intake, weight, mobility, psychological stress, neuropsychological problems, and BMI. Nutrition status is then reported as a category on an ordinal scale. A score of 0–7 indicates malnourished, 8–11 at risk of malnutrition, and 12–14 normal nutrition status. In this study, body weight and height were measured and BMI was electronically calculated by trained nurses according to standard procedures. BMI < 20 kg/m² indicated malnourished or at risk of malnutrition [9]. Weight loss in the past 6 months was obtained from Fried Frailty criteria collection form [10]. We considered that weight loss greater than 3 kg was clinically significant, consistent with malnourished or at risk of malnutrition.

2.2. Statistical Analysis

We estimated Cohen's kappa statistic (κ) for agreement among three malnutrition assessment tools. We followed Landis and Koch for interpretation [11], with $\kappa < 0$ as indicating no agreement, 0–0.20 as slight, 0.21–0.40 as fair, 0.41–0.60 as moderate, 0.61–0.80 as substantial, and 0.81–1 as almost perfect agreement. Sensitivity analyses were used to assess the Cohen's kappa agreement among BMI, MNA and weight loss among non-obese older patients with cancer. A p-value of <0.05 indicated statistical significance. SAS software version 9.3 (SAS Institute, Inc., Cary, NC) was used for the data analysis.

3. Results

We assessed 319 participants who had been diagnosed with hematologic malignancies or solid tumors (including prostate, breast, colorectal, bladder, and lung). Of these, 306 were included in our final analysis; 13 were excluded due to ineligibility (younger than 65 years,

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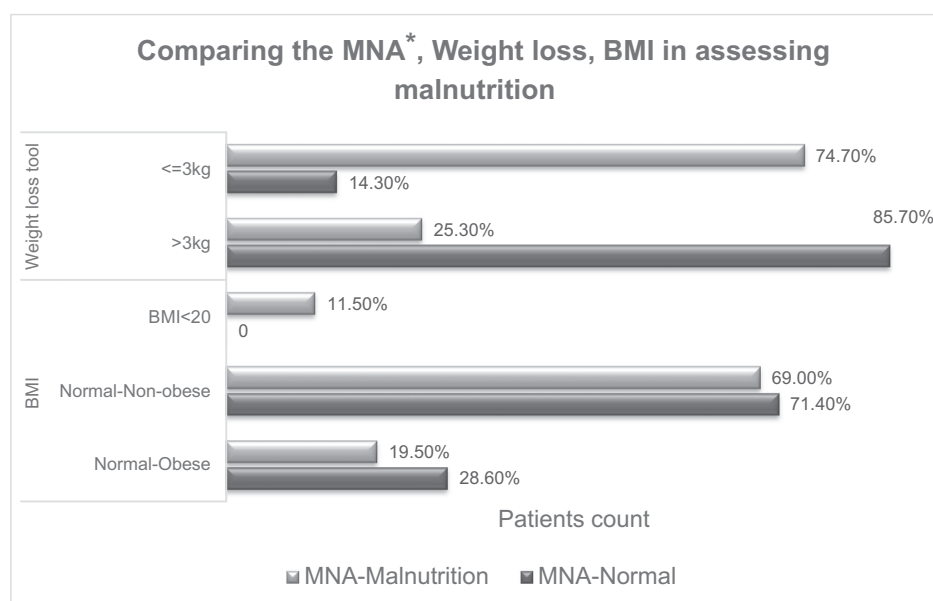


Fig. 1. Cohen's Kappa agreement between MNA, BMI, and weight loss. Cohen's Kappa agreement between MNA and weight loss was 0.57 (95% CI = 0.43, 0.70). Cohen's Kappa agreement between MNA and BMI was -0.14 (95% CI = -0.22 , -0.08). Cohen's Kappa agreement between BMI and weight loss was -0.08 (95% CI = -0.17 , 0.01). *MNA, Mini Nutrition Assessment; BMI, body mass index.

or on no cancer treatment). The MNA was performed in 202 patients. Sixty-six (33.0%) were categorized as malnourished and 62 (31.0%) as at risk for malnutrition. Weight loss information was obtained from 174 patients, and BMI information was abstracted in 290 patients. Weight loss greater than 3 kg was seen in 92 (53.0%) of 174 patients and BMI <20 kg/m² was recognized in 20 of 290 patients (7.0%). Among the 136 patients with all three assessment tools available, malnutrition was associated with weight loss of greater than 3 kg in 6 months on the basis of the MNA ($p < 0.0001$), with a Kappa agreement of 0.57 (95% CI 0.43–0.70), while the Kappa agreement for BMI scale with MNA was -0.14 . When the analyses were done only among non-obese older patients with cancer, the Kappa agreement for BMI scale and MNA were still negative (no agreement), but decreased to -0.17 (Fig. 1, Table 1).

4. Discussion

Malnutrition was associated with weight loss of greater than 3 kg in 6 months on the basis of the MNA, with a moderate agreement, while the Kappa agreement for BMI scale with either MNA or weight loss was negative. When the analyses were done only among non-obese older patients with cancer, the kappa magnitude for BMI scale with MNA, and MNA with weight loss both were attenuated, suggesting that obesity may be a confounder for BMI.

A previous study [4] concluded that BMI below 20 kg/m² had high sensitivity (58.9%) for the diagnosis of severe malnutrition in elderly

and patients with cancer but not in patients with cirrhosis with tense ascites or cardiovascular or neurological disease. However, we found a small kappa agreement for BMI <20 kg/m² with MNA and weight loss. The confounder for using BMI as a simple screening tool is that many patients with cancer who experience malnutrition are also obese [12]. Malnourished obese patients have worse outcomes as compared to well-nourished obese patients [13]. BMI may not be as effective a screening tool for malnutrition in older patients with cancer as recent weight loss and decreased oral intake [14].

There was a moderate agreement between MNA and weight loss in assessing malnutrition in older patients with cancer in our study, a finding consistent with the results of Loh et al. [15], where investigators concluded that unintentional weight loss was the most important predictor of malnutrition risk, even if the patient's BMI was not suggestive of malnutrition. In the 2012 Consensus Statement of the Academy of Nutrition and Dietetics and American Society for Parental and Eternal Nutrition on the criteria for weight loss within ASPEN determined that a weight loss of 7.5%–10% in 6 months indicates moderate malnutrition, while a loss of 10%–20% indicates severe malnutrition. The greatest strength of the current study is that it is one of the first to compare three malnutrition assessment methods—MNA, weight loss, and BMI—among older patients with cancer, allowing us to compare the agreement of these three malnutrition screening tools in these patients. Malnutrition with obesity is a complex condition that appears to be commonly encountered in older patients with cancer. Our study has several limitations. First, in our study only 136 patients completed

Table 1
Cohen's Kappa agreement among MNA, BMI, and weight loss in assessing malnutrition among older cancer patients (N = 136).

Assessment tools	Category	MNA-N (%)		P-value	Kappa (κ)	95% CI for κ	Kappa (κ) between BMI and weight loss	95% CI for κ
		Normal	Malnutrition					
BMI	Obese	14 (28.6)	17 (19.5)	0.03	-0.14	-0.22 , -0.06	-0.08	-0.17 , 0.01
	Non-obese	35 (71.4)	60 (69.0)					
BMI < 20	Malnutrition	0	10 (11.5)					
Weight loss	> 3 kg	42 (85.7)	22 (25.3)	<0.01	0.57	0.43, 0.70		
	<=3 kg	7 (14.3)	65 (74.7)					

MNA: Mini Nutrition Assessment; BMI: body mass index; CI: confidence interval.

all three assessment—MNA, weight loss, BMI. However, our study population had similar demographic and clinical characteristics as the population overall. Thus, a greater sample size may be needed to confirm our findings. Second, our study was performed in a single large academic cancer care center. Therefore, our findings may not fully represent community cancer practice. Finally, even though a low MNA score was found to be an independent predictor of non-hematologic toxicity among older adults starting chemotherapy [16], more studies are needed in patients with cancer, to assess the predictive capability of scales such as the MNA in determining clinical outcomes.

5. Conclusion

Screening for malnutrition should be an integral part of the care of older patients with cancer. Earlier identification and appropriate nutrition support may help to reverse or halt the malnutrition trajectory and the negative outcomes associated with poor nutritional status in older patients with cancer. In summary, there is a moderate agreement between MNA and weight loss but no Kappa estimates measuring agreement for BMI scale and MNA in prediction of malnutrition. The three measures of malnutrition are not well correlated and this should be considered in selecting measures for future clinical practice and clinical trial design.

Disclosures and Conflict of Interest Statements

We were funded by University of Texas MD Anderson Cancer Center. We were in control of all the primary data, and this data could be available for analysis. The authors have no conflict of interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <http://dx.doi.org/10.1016/j.jgo.2017.07.012>.

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