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A comparison of the full Mini Nutritional Assessment, short-form Mini Nutritional Assessment, and Subjective Global Assessment to predict the risk of protein-energy malnutrition in patients on peritoneal dialysis: A cross-sectional study

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ABSTRACT

Background: The full Mini Nutritional Assessment (full-MNA) and short-form MNA (MNA-SF) are simple and effective nutrition screening scales, but their usefulness for identifying patients with peritoneal dialysis (PD) at risk of protein-calorie malnutrition (PEM) has not been investigated.
Objectives: This study was aimed to investigate the convergent validity of the full-MNA and MNA-SF for identifying patients with PD at risk of PEM.
Design: A cross-sectional study.
Setting: A hospital-managed dialysis center.
Participants: 80 adult ambulatory PD patients.
Methods: Patients were interviewed for personal data and rated with the full-MNA, MNA-SF and the Subjective Global Assessment (SGA) for nutritional status. The consistency among the scales was assessed with kappa coefficients. The ability of each scale to differentiate undernutrition was evaluated with external standards including serum albumin and creatinine concentrations, mid-arm and calf circumferences, and dialysis-related indicators. Statistical significance was evaluated with Wilcoxon rank-sum test.
Results: The full-MNA and MNA-SF showed low agreements with the SGA (kappa = 0.346 and 0.185, respectively). The full-MNA and MNA-SF performed better than the SGA in differentiating undernutrition according to the external standards. However, contrary to general expectation, MNA-SF rated a significantly smaller proportion of subjects at risk of undernutrition.
Conclusion: The full-MNA and MNA-SF are more able than the SGA in identifying PD patients at risk of PEM. However, MNA-SF rates a smaller proportion of PD patients at risk of undernutrition than the full-MNA. The use of MNA-SF as a stand-alone unit requires further confirmation.

What is already known about the topic?

- Patients on dialysis are at an increased risk of protein-energy malnutrition. Early identification of the risk is important for timely intervention.

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- The Subjective Global Assessment (SGA) is a tool recommended by K/DOQI for identifying those who are at risk of protein-energy-malnutrition (PEM).
- Other simple and non-invasive tools, such as the mini-nutritional assessment (MNA) may also be appropriate for rating the risk but have not been evaluated.

What this paper adds

- Predictions made with the SGA, the full-MNA and the short-form-MNA do not agree well to each other.
- According to external standards including a list of biochemical, anthropometric, health- and dialysis-related indicators, the full-MNA and the MNA-SF were more able to differentiate malnutrition in PD patients at risk of PEM than the SGA.
- The full-MNA appears appropriate for rating the risk of PEM in PD patients. The use of MNA-SF as a stand-alone unit requires further confirmation because it rates a smaller proportion of patients at risk of PEM than the full-MNA.

1. Introduction

Protein-energy malnutrition (PEM, inadequate intake of total energy and protein) or undernutrition is prevalent and associated with increased risk of mortality in patients with end stage renal disease (ESRD) (CANADA-USA, 1996; Chung et al., 2000; Lacquaniti et al., 2009). In these patients, dietary restrictions, altered sensory functions, drug–nutrient interactions and uremic conditions further contribute to poor appetite and aggravate the risk of PEM. In maintenance peritoneal dialysis (PD) patients, co-morbid diseases are also believed to contribute to PEM, hypoalbuminemia, muscle wasting and higher mortality (Chung et al., 2003). Thus, in these patients, early identification of those who are at risk of PEM may help prevent severe malnutrition and muscle wasting. A simple, reliable and easy-to-use tool is vitally important.

Nutritional status of dialysis patients can be assessed with serum biochemical indicators, anthropometry, and health- or dialysis-related indicators (National Kidney Foundation, 2000). However, none of these parameters is reliable enough to be universally accepted as a gold standard. Instead, the nutritional status of ESRD patients is generally rated with multiple indicators or scales that consist of multi-dimensional nutritional and health indicators. The U.S. National Kidney Foundation Kidney Disease/Dialysis Outcomes and Quality Initiative (K/DOQI) (National Kidney Foundation, 2000) and the Taiwan Society of Nephrology (2004) recommend the Subjective Global Assessment (SGA) as a regular tool for assessing PEM in the adult dialysis population. The SGA determines whether nutrient assimilation has been restricted because of decreased food intake or poor digestion and absorption, whether malnutrition has affected the function of organs, and whether the patients' disease process influences nutrient requirements (National Kidney Foundation, 2000). However, there are other simple and effective tools worth to be evaluated.

The Mini Nutritional Assessment (MNA), a widely used geriatric nutritional screening/assessment scale, is well known for its simplicity, portability, reliability and non-invasiveness. It has been shown to be effective for screening/identifying persons at risk of undernutrition living in a variety of settings (Cabrera et al., 2007; Guigoz et al., 2002; Tsai et al., 2010a) or having various health conditions (Kuzuya et al., 2005; Tsai et al., 2009a) or chronic diseases (Read et al., 2005; Tsai et al., 2009b, 2010b). The MNA has been shown to be appropriate for rating the risk of undernutrition in hemodialysis (HD) patients (Tsai and Chang, 2011; Tsai et al., 2009b, 2011), but its use in PD patients is largely unexplored. The PD patients are a select subgroup of the ESRD population. They are usually younger and less likely to have primary diagnosis of diabetes or hypertension (Flanigan et al., 2001). However, they are also subject to nutritional risks. Hence, the aim of the present study was to investigate the convergent validity of the MNA, using biochemical, anthropometric and dialysis-related measures as criteria for comparison.

2. Methods

2.1. Design and sampling

We conducted a cross-sectional study and recruited subjects from PD patients of a hospital-managed dialysis center in central Taiwan. A clinical nurse at the center (coauthor TYL) approached each patient during a routine treatment visit, explained the study protocol and asked him/her for voluntary participation. Adult PD patients who had been patients of the center for three months or longer, and were without acute disease or infection and able to communicate verbally were qualified to participate. Among the 90 patients at the center, 80 met the selection criteria and agreed to participate in the study; 8 were unable to communicate or had acute disease/infection at the time of admission; and 2 chose not to participate. All subjects had been patients of the center for more than 90 days (a period for a new PD patient to be stabilized).

The required sample size was estimated by the formula used for planning studies in two-sample comparisons: $N = [(k+1)^2/k] \times \sigma^2 \times [Z_{1-\alpha/2} + Z_{1-\beta}]^2)/d^2$, where k is the proportion of the two sample sizes, σ^2 is the common variance and d is the mean difference between two samples (Rosner, 2006). We assumed that the prevalence of undernutrition was 20% in PD patients ($k = 4$), the mean difference in serum albumin between two samples was $d = 0.3$ g/dL and common variance $\sigma^2 = (0.43)^2$. Under significance level $\alpha = 0.05$ and 80% power, the required sample size would be 101. For the recruited sample size of 80, it could achieve around 70% power.

All those who qualified and agreed to participate signed an informed consent prior to admission. The study protocol was approved by the Institutional Review Board of the hospital. Ethics guidelines and subjects' confidentiality were observed throughout the study. The study took place during September to December 2010.