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The MNA, but not the DETERMINE, screening tool is a valid indicator of nutritional status in elderly Africans

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Abstract

Objectives: We compared the validity of existing nutrition screening tools for use in older South Africans.

Methods: This was a cross-sectional study in 283 free-living and institutionalized black South Africans ≥60 y of age. Trained fieldworkers administered a 24-h recall, the DETERMINE and Mini-Nutritional Assessment (MNA) screening tools, and performed anthropometric measurements and physical function tests. Biochemical indicators assessed included serum albumin, hemoglobin, ferritin, vitamin B12, red blood cell folate, cholesterol, and vitamin C. The six-item Cognitive Impairment Test was used to assess cognitive function.

Results: The MNA score was positively and significantly associated with anthropometric measurements, cognitive function, instrumental activities of daily living and, in women only, percentage of body fat, handgrip strength, and activities of daily living. Compared with the MNA, the DETERMINE instrument had a low positive predictive value (55.6%) and specificity (11.2%), resulting in a high rate of false positives classified as being malnourished.

Conclusion: The MNA, but not the DETERMINE, screening tool is appropriate for use in identifying older black South Africans who are malnourished or at risk of malnutrition.

Keywords: Elderly; Nutrition screening; Africans; Nutritional risk; Mini-Nutritional Assessment; DETERMINE

Introduction

The elderly are typically the greatest users of health care services and place a burden on limited health care resources. Malnutrition in this age group is associated with serious negative consequences, such as a higher prevalence of infections and hospitalization and an increased morbidity and mortality [1]. The prevalence of malnutrition among elderly persons living in nursing homes ranges from 17% to 65% [2]. In community-dwelling older persons, the prevalence has been shown to be 5–10% and remains largely undetected [3,4]. However, appropriate screening and intervention have been shown to result in remarkably improved outcomes. A moderate exercise program and adequate dietary intake significantly improved muscle strength and mobility among frail residents of homes for the aged [5]. Similarly, in community-dwelling elderly in Chile, a 1-y resistance training and nutritional supplementation program improved respiratory function, upper and lower body strength, and walking capacity [6]. Aggressive nutritional support of malnourished hospitalized elderly surgical patients has been shown to result in a 15–30%

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reduction in rehabilitation time, a 40% reduction in the duration of hospitalization, and a significant reduction in mortality and morbidity [7].

Regarding indicators for nutritional status, epidemiologic studies have shown a U-shaped curve between baseline body mass index (BMI) and mortality [8–11]. Low body weight and rapid unintentional weight loss are highly predictive of mortality and morbidity in older populations [12,13]. Similarly, a low serum albumin concentration (a non-specific marker of malnutrition), has been shown to be an independent risk factor for all-cause mortality in the elderly [14].

In much the same way as global evaluation of physical, mental, and social status is fundamental to assessing the health status of the elderly and is determined using instruments such as Activities of Daily Living (ADL), Instrumental Activities of Daily Living (IADL), the Mini-Mental State Examination, and the Geriatric Depression Scale, it has been recommended that nutritional assessment should be routinely included in the clinical assessment of older persons [15].

Many countries, in recognition of the importance of an optimal nutritional status in this age group, have adopted national nutrition screening initiatives for the elderly, aimed at the early detection of nutritional problems and the provision of appropriate standards of care to high-risk individuals. A self-administered screening tool (checklist), "DETERMINE," was originally developed and validated in older Americans by a joint venture of the American Academy of Physicians, the American Dietetic Association, and the National Council on the Aging (together known as the Nutrition Screening Initiative) [16] and subsequently adapted for use in older Australians [17]. The nutrition checklist has been found to be significantly predictive of a less nutritionally adequate food intake and a poorer perceived health status after adjustment for age and gender [18].

In Europe, the Mini-Nutritional Assessment (MNA) is an 18-item questionnaire that can be completed within 15 min and includes four domains, namely anthropometric assessment, general assessment, dietary assessment, and self-assessment of health and nutritional status [19]. The MNA was originally validated in nursing home and hospital-bound elderly [15,19] but has subsequently been used to screen healthy, free-living elderly for the risk of chronic disease [20,21] and pre- and postoperative outcomes [22,23]. However, the applicability of the MNA in older adults in developing countries is largely unknown; in Chile, the tool failed to identify persons at risk of malnutrition [24]. Chumlea et al. [25] questioned the applicability of using the MNA in ethnic groups with non-Western cultural and dietary habits and in countries with health care systems that differ from the European model. They recommended that such screening instruments be adapted to be as country, culturally, and ethnically specific as possible. Neither the MNA nor the DETERMINE instrument has been widely used in older African populations. The present study compared the MNA and DETERMINE scores with anthropometric, dietary, and biochemical data and with indicators of physical and cognitive functioning in older South Africans. A secondary objective was to assess sensitivity and specificity of the MNA Short Form (MNA-SF) against the full MNA instrument.

Materials and methods

Subjects and sampling

A cross-sectional validation study was conducted in the peri-urban areas of Cape Town, South Africa in black men and women who were free-living in the community or frail/institutionalized. The age eligibility of subjects was set at a minimum of 60 y because this is the age (for women; 65 y for men) at which citizens are eligible to receive the means-tested social old-age pension. Community-dwelling subjects were recruited from church groups, luncheon clubs, and community health center facilities, and frail subjects were recruited from state-subsidized homes for the aged, daycare centers for the elderly, or from lists of applicants applying for entry into category 3 homes (residents requiring maximum care). A sample of 300 subjects was calculated using the EpiInfo statistical package [Centers for Disease Control and Prevention (CDC), USA], assuming malnutrition prevalences of 30% and 15% in the frail elderly and community-dwelling groups, respectively (80% statistical power and α error of 5%), with an expected attrition rate of $\geq$15%. Approval for the study was granted by the research and ethics committee of the University of Cape Town.

Data collection

All study subjects were interviewed by trained fieldworkers and questionnaires were administered in the subjects' home language (Xhosa) or English, if preferred, in their place of residence.

Dietary intake and household food security

A 24-h recall dietary assessment method was used, which required the subject (or the person responsible for food preparation in the household or institution) to report all food and drink items consumed during the previous 24-h period. Standard household measuring utensils, rulers, and validated food photographs of typical South African foods [26] were used to quantify food portions. The recorded quantities of food consumed were converted to gram weights using the Medical Research Council (MRC) food quantities manual [27]. Average daily nutrient intake was calculated using the Foodfinder III computerized dietary assessment program (WAMTechnology CC, Cape Town, South Africa), which is based on the 1991 MRC food composition tables [28] and subsequent supplements to the original tables [29]. To assess the validity of the dietary assessment method, reported energy intakes were compared with estimated minimal energy requirements. Resting met-