Prevalence of and Factors Associated with Undernutrition in a Geriatric Outpatient Setting: Results from a Multidimensional Nutritional Assessment

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ABSTRACT

Objective: To determine the prevalence of and factors associated with undernutrition in older patients in a geriatric outpatient setting.

Methods: A cross-sectional study in people aged 65 years or older was conducted at a geriatric outpatient clinic in Bangkok, Thailand. Nutritional status was assessed by Mini Nutritional Assessment (MNA) score. Demographic data, activities of daily living, food frequency questionnaire (FFQ), anthropometric measurements, complete blood count, and serum albumin were recorded in every subject. Body composition analysis was measured by bioelectrical analysis (BIA) at the same visit.

Results: Three hundred and twenty-four adults (63% women) with a mean age of 77.5 years (SD 6.8 years) were enrolled. Prevalence of undernutrition, at-risk of undernutrition, and well-nourished were 8.3%, 35.5%, and 56.2%, respectively. In univariate logistic regression analysis, factors associated with increased risk of undernutrition (defined by MNA <24) were dependency in carrying out instrumental activities of daily living (IADL) or basic activities of daily living (BADL), dementia, depression, low education, cerebrovascular disease, polypharmacy, female, multiple co-morbidities, and increasing age. In multivariate logistic regression analysis adjusted for age and gender, depression, cerebrovascular disease, and dementia were significantly associated with risk of undernutrition.

Conclusion: Although older patients in our study had higher socioeconomic status than general population, the prevalence of undernutrition in our geriatric clinic was high. Factors significantly associated with undernutrition in our study were depression, cerebrovascular disease, and dementia. Early recognition and intervention are essential for effective undernutrition prevention.

Keywords: Mini nutritional assessment; nutritional status; geriatric clinic; geriatric outpatients; undernutrition (Siriraj Med J 2018;70: 413-418)

INTRODUCTION

The increasing number of older people is one of society's most important and pressing health policy planning issues. The prevalence of undernutrition is increasing more among the elderly than in any other age group. Undernutrition is associated with mortality, morbidity, infection, hospitalization, and lower quality of life.[1,2] The prevalence of undernutrition in previous studies ranged between 5.3% and 53.1%,varying according to clinical setting and diagnostic criteria.[3-6] Prevalence of undernutrition may be higher in the hospital or institutional setting than in the community-dwelling setting.[3] Few studies have explored undernutrition in a geriatric outpatient setting[2,7,8], which is a specialized setting for

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elderly patients who have multiple comorbid diseases or geriatric syndromes, such as cognitive impairment and mobility disorders. The prevalence of undernutrition in this patient population is likely to be high and factors associated with undernutrition should be identified, so that an undernutrition prevention strategy can be developed. Accordingly, the objective of this study was to determine the prevalence of and factors associated with undernutrition in older patients in a geriatric outpatient setting.

MATERIALS AND METHODS

Study design and population

This cross-sectional study recruited patients who visited the Geriatric Clinic, Faculty of Medicine Siriraj Hospital, Mahidol University (Bangkok, Thailand) during January 2014 to October 2015 study period. The study followed STROBE statement for observational study.[9] Inclusion criteria were patients aged 65 years or older who scored higher than 23 on the Thai Mental State Examination (TMSE) cognition test. Subject candidates with a TMSE score < 23 who had well-informed caregivers that were able to give reliable information were also included. Patients with a TMSE score < 23 who were unable to communicate or who were without a caregiver able to provide reliable information were excluded. Written informed consent was obtained from all patients or legal representatives. The protocol for this study was approved by the Siriraj Institutional Review Board (Si 016/2014).

Data collection

Patient demographic data, including age, education, and socioeconomic status were collected by face-to-face interview and/or medical record review. Comorbid diseases were scored by Charlson Comorbidity Index.[10] All drugs taken by patients in this study were reviewed for potentially inappropriate use using the American Geriatrics Society updated Beers Criteria.[11]

All patients underwent activities of daily living assessment using Barthel Index[12] and Lawton Index[13], respectively. Thai Mental State Examination (TMSE)[14] and Thai Geriatric Depression Scale (TGDS)[15] were used to evaluated cognitive function and mood respectively. A food frequency questionnaire which was validated by both geriatricians and nutritionists was used for the estimation food intake. All patients underwent physical examination and anthropometric measurement. Complete blood count and serum albumin level were obtained to determine nutritional status. Body composition analysis by bioelectrical analysis method using Inbody® 720 (InBody Co., Ltd, Cerritos, CA, USA) was performed in all patients not having pacemaker or metallic surgical implantation.

Patient nutritional status was assessed by Mini Nutritional Assessment (MNA).[16] MNA is a 30-point validated questionnaire which consists of questions that include anthropometric, general, dietary, and subjective assessment. Scores of <17, 17-23.5, and ≥24 defined undernutrition, at-risk of undernutrition, and well-nourished status, respectively.

Data analysis

Patient clinical and demographic data were reported as percentage, mean and standard deviation (SD), or median and inter quartile range (IQR). Comparisons among 3 nutritional status groups were performed using analysis of variance (ANOVA) or Kruskall-Wallis test depend on distribution of variables. Chi-square test was used for categorical variables.

Univariate and multivariate logistic regression analyses adjusted for age and gender were performed to assess and identify factors associated with MNA <24. These results were presented as odds ratio (OR) and 95% confidence interval (95% CI). Data analysis was performed using SPSS Statistics version 18 for Windows (SPSS, Inc., Chicago, IL, USA).

RESULTS

Three hundred and twenty-four patients were enrolled in this study. Mean (SD) age was 77.5 (6.8) years and 63.3% were female. According to MNA classification, 8.3%were undernourished, 35.5% were at-risk for being undernourished, and 56.2% were well-nourished. Patient demographic and clinical data by nourishment classification are shown in Table 1. There were statistically significant differences among groups for age, gender, ambulation status, educational level, history of physical exercise, Charlson Comorbidity Index, BADL score, IADL score, TMSE score, number of medications used, diagnosis of each disease in dementia, depression, Parkinson disease, and stroke. We also found body mass index (BMI), fat mass, skeletal muscle mass, hemoglobin, total lymphocyte count, and serum albumin level to be significantly different among the 3 nutritional status groups.

Data from the 60-item semi-quantitative food frequency questionnaire did not demonstrate significant differences in food consumption among the 3 groups.

In univariate logistic regression analysis, factors associated with increasing risk of undernutrition (defined as MNA <24) included dependency in carrying out IADLs or BADLs, dementia, depression, education level of less than 4 years, cerebrovascular disease, drug usage > 5 items,

TABLE 1. Demographic and clinical characteristics of the study population (n= 324), classified by nutritional status.

Characteristics	Undernutrition (N=27)	At risk of undernutrition (N=115)	Well-nourished (N=182)	*p*-value
Age, (years)*	81.2 (7.3)	78.9 (6.5)	76.6 (6.6)	<0.001
Female, (%)	70.4	71.3	57.1	0.035
Walking independently, (%)	33.3	61.7	80.2	<0.001
Education < 4 years, (%)	55.5	63.5	42.8	0.03
Current alcohol use, (%)	0.0	0.9	6.0	0.119
Current exercise, (%)	14.8	33.0	41.8	0.016
Income (baht),†	12,000 (10,000.0-22,000)	17,500 (10,000.0-36,500.0)	20,000 (10,000.0-32,500.0)	0.749
Charlson Comorbidity Index,†	6.0 (5.0-7.0)	5.0 (4.0-6.0)	4.0 (3.0-5.0)	<0.001
Dementia, (%)	88.9	69.6	41.2	<0.001
Depression, (%)	85.0	53.9	21.0	<0.001
Parkinson disease, (%)	37.0	40.9	16.5	<0.001
Cerebrovascular disease, (%)	33.3	20.0	11.5	0.007
Hypertension, (%)	59.3	68.7	69.2	0.578
Diabetes, (%)	37.0	36.5	32.4	0.731
Malignancy, (%)	7.4	2.6	5.5	0.395
Barthel Index,†	80.0 (45.0-100.0)	100.0 (90.0-100.0)	100.0 (100.0-100.0)	<0.001
Lawton Index,†	8.0 (8.0-17.0)	15.0 (9.0-23.0)	23.0 (6.0-24.0)	<0.001
TMSE,†	20.0(16.0-24.0)	23.0 (19.0-26.0)	26.0 (23.3-28.0)	<0.001
Number of medications,†	7.0 (4.0-9.0)	7.0 (5.0-10.0)	6.0 (4.0-9.0)	0.022
Anticholinergic drug use, (%)	14.8	16.7	19.9	0.695
Metformin use (111 cases), (%)	30.0	42.9	49.2	0.497
Body mass index, (kg/m^2)*	19.2 (3.0)	22.7 (4.1)	25.9 (4.2)	<0.001
Fat mass, (kg)†‡	11.0 (8.1-17.3)	17.9 (11.5-23.4)	20.6 (15.9-27.0)	<0.001
Skeletal muscle mass, (kg)†‡	16.6 (12.3-20.0)	17.4 (15.9-20.6)	20.2 (17.5-25.1)	<0.001
Hemoglobin, (g/dl)*	11.3 (1.4)	12.0 (1.6)	12.8 (1.4)	<0.001
Total lymphocyte count, (cells/mm^3)†	1,630.2 (1,265.5-2,118.8)	1,725.2 (1,347.2-2,259.8)	2,010.6 (1,661.7-2,487.1)	0.002
Serum albumin, (gm/dl)†	3.7 (0.6)	4.0 (0.3)	4.1 (0.3)	<0.001

*Mean (SD); † Median (IQR); ‡231 cases

Abbreviation: TMSE = Thai Mental State Examination

female gender, multiple co-morbidity, and increasing age. Patients who reported that they currently consume alcohol and patients having high total lymphocyte count, hemoglobin, or serum albumin level were at decreased risk of being malnourished.

In age- and gender-adjusted multivariate logistic regression analysis, depression, cerebrovascular disease, and dementia remained associated with an increased risk of undernutrition, with OR's (95% CI) of 2.9 (1.6-5.2), 3.2 (1.6-6.6), and 2.3 (1.3-4.2), respectively (Table 3).

TABLE 2. Factors significantly associated factors with MNA score <24, according to univariate logistic regression analysis.

Factors	Odds ratio (95% CI)
IADL dependence	5.3 (3.1-9.2) †
BADL dependence	3.6 (2.2-6.0) †
Dementia	3.9 (2.4-6.3) †
Depression	3.4 (2.0-5.7) †
Education level (<4 years)	2.2 (1.4-3.4)*
Cerebrovascular disease	2.2(1.2-4.1)*
Medication (>5 items)	1.9 (1.1-3.1)*
Female	1.8 (1.2-2.9)*
Charlson Comorbidity Index (each score)	1.4(1.2-1.7) †
Age, (years)	1.1 (1.0-1.1) †
Total lymphocyte count, (per 100 cell/mm^3)	1.0 (0.9-1.0)*
Hemoglobin, (g/dL)	0.7 (0.6-0.8) †
Serum albumin, (gm/dL)	0.2 (0.1-0.4) †
Current alcohol use	0.1 (0.0-0.9)*

*p<0.05, †p<0.001

TABLE 3. Factors significantly associated with MNA score <24, according to multivariate logistic regression analysis (adjusted for age and gender).

Factors	Odds ratio (95% CI)
Depression	2.9 (1.6-5.2)†
Cerebrovascular disease	3.2 (1.6-6.6)*
Dementia	2.3 (1.3-4.2)*

*p<0.05, †p<0.001

DISCUSSION

Based on MNA, the prevalence of malnourished and at-risk of undernourished patients was 8.3% and 35.5%, respectively. Factors associated with undernutrition in multivariate analysis were depression, cerebrovascular disease, and dementia.

Compared to results from several studies with similar undernutrition diagnostic criteria and population settings[2,7,8], these prevalence figures are slightly lower than previous studies in geriatric outpatient clinics in Turkey and the Netherlands which reported prevalence of 13% and 17%, respectively. These differences may result

from differences in the study population, including age, comorbidity, and function. The baseline characteristics of subjects in the present study had more advanced age, more severe comorbidity (defined by higher score of Charlson Comorbidity Index), and more functional dependency.

Among all associated factors, we found that depression had the highest association with MNA score of less than 24 (OR 2.9; 95% CI 1.6-5.2), whereas, other studies demonstrated various degrees of association. Anorexia is one of the diagnostic criteria for depression and social isolation is a common feature in patients who are depressed. These clinical manifestations are likely to affect nutritional status. Furthermore, depressed patients who take some specific antidepressants (eg. flueoxetine) are at potential risk of undernutrition.[17,18]

Cerebrovascular disease (CVD) was identified as one of the significant determinants of undernutrition in this study (OR 3.2; 95% CI 1.6-6.6). This result was consistent with findings from a study by Saka.[2] Mobility problem is a common symptom in stroke patients that limits their access to food and their food preparation capacity. In addition, dysphagia and aspiration in stroke patients directly results in undernutrition. A systemic review that included 8 studies showed that the odds of being malnourished were higher among subjects with dysphagia, as compared to subjects without dysphagia (OR 2.425; 95% CI 1.264-4.649, $p<0.008$).[19] Also, stroke patients may be depressed, have altered level of consciousness, and be cognitively impaired, which could result in poor oral intake leading to undernutrition.[20,21]

Dementia was also identified as an essential determinant for undernutrition (OR 2.3; 95% CI 1.3-4.2). This association was shown in previous studies from Turkey. The pathophysiology of weight loss in dementia patients is a multifactorial process.[22-24] Some previous studies reported the effect of degenerative processes in particular brain areas, especially in the olfactory system and the brain area involved in appetite and eating habit.[23] Other studies found an increase in several inflammatory cytokines, such as tumor necrotic factor alpha (TNF-α) and interleukin -6 (IL-6), in the plasma of Alzheimer's disease and vascular dementia patients and this pro-inflammatory state in these patients may promote anorexia and weight loss.[24-25] Moreover, dementia patients with reduced self-care abilities, particularly ones without caregivers, would have limited access to food, thus leading to even poorer nutritional status.

Undernutrition is associated with several adverse clinical outcomes. However, this process is reversible. Early detection of undernutrition with appropriate screening tools is the key to prevention of undernutrition-related consequences, especially in elderly patients with depression, cerebrovascular disease, and/or dementia. The European Society for Clinical Nutrition and Metabolism (ESPEN) recommends screening for undernutrition in every person with dementia at the time dementia is diagnosed.[24] However, at the present time, no consensus has been reached regarding how often undernutrition screening should be performed. Although, previous studies have shown association between undernutrition and depression and stroke,[7,20] there are currently no recommendations regarding screening and assessment of undernutrition in patients with these conditions.

The strengths of this study include all 4 dimensions of nutritional evaluation, including food intake estimation, anthropometric measurement, laboratory data analysis, and body composition analysis. In clinical practice, we evaluated patient nutritional status using a combination of diagnostic tools. It can be logically explained that the more methods used to evaluate and diagnose, the more accurate the diagnosis. Moreover, all diagnostic tools used in this study were validated, well-recognized, widely-used, and easily and reliably reproducible.

This study had some mentionable limitations. Our geriatric clinic is a special clinic for complicated cases that is located in a highly populated urban metropolis (Bangkok, Thailand) and at the largest university-based tertiary referral center in Thailand. As such, the findings of this study may not be generalizable to all settings. In addition, subjects in this study had a generally higher socioeconomic status than the normal elderly population living in the same area. It is, therefore, possible that the prevalence of undernutrition maybe underreported. Further studies with larger study populations in general geriatric outpatient settings should be underestimated to confirm the results of this study before nutritional screenings' policy implementation.

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